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### Trees on Farms.

Those parts of our country which were first settled, were originally covered with dense and noble forests. These had to be laid low with the woodman's axe, and consumed in his log fires, in order to reclaim the land for the plow, and fit it for receiving "the seed of the sower." The very superabundance of timber rendered it of no value, but for building houses, making a few implements, and for burning as fuel. To clear the soil of timber was the great object of the pioneer farmer, and trees were regarded by him as an incumbrance. Before such a spirit great forests have disappeared without a thought having been exercised, as to the natural uses of trees in the economy of nature.

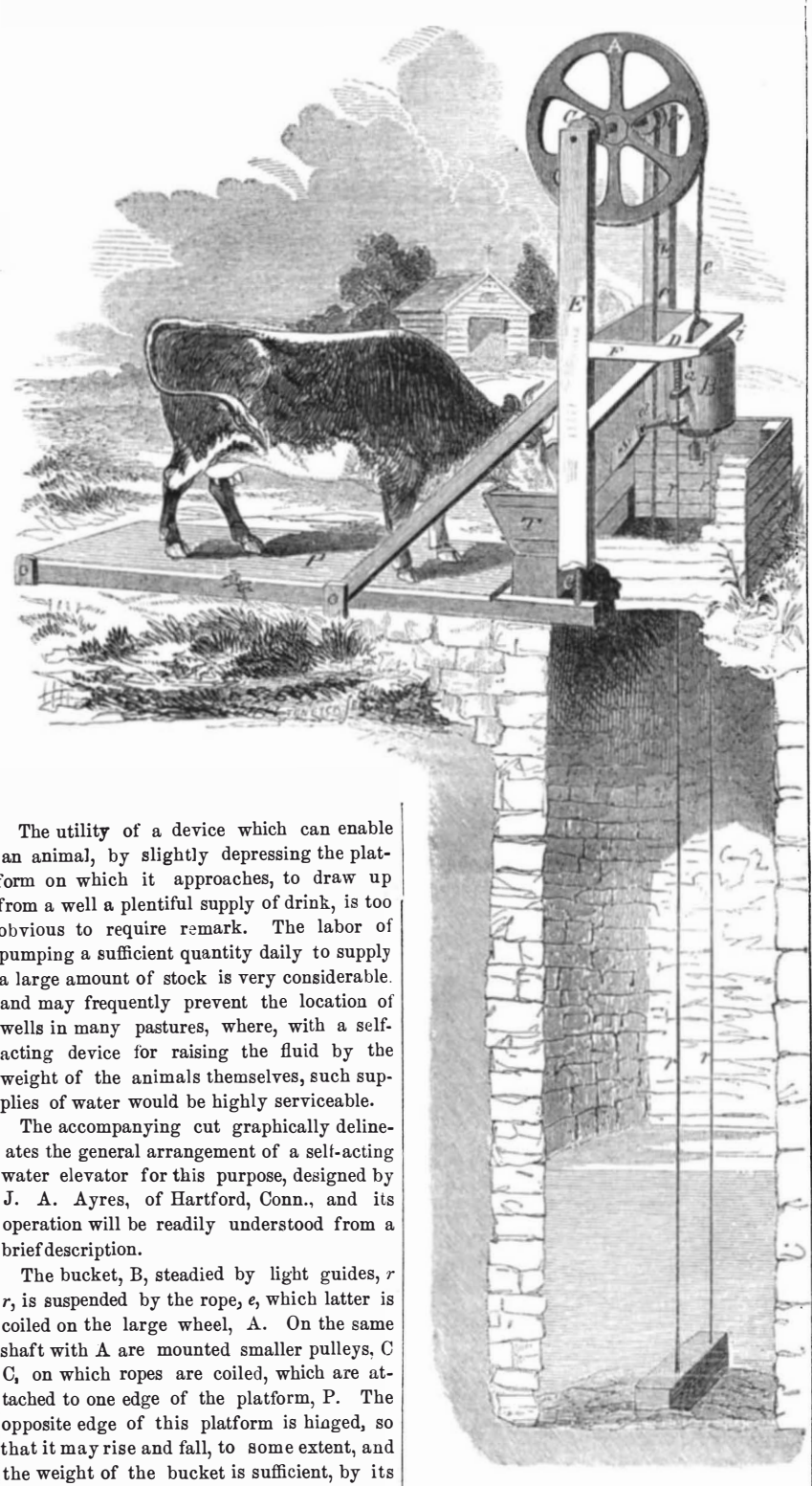
Trees, like mountain ranges, attract clouds and promote rains, without which the most fertile lands become barren wastes.

There are some parts of our country—especially western New York—that are now often visited with long summer droughts, where fifty years ago showers of refreshing rain were more frequent and regular; as a consequence the soil does not now yield so abundantly. Some streams that once rolled along in full swelling currents, driving busy mills throughout the entire year, are now almost dry water-worn courses during a number of months, at least, and the mills on their banks have fallen to decay. This has been caused by the destruction of the forests. They acted the part of reservoirs (by preventing evaporation) to the streams, and as conductors to the rain clouds.

In some parts of Asia and Africa the ruins of large ancient cities are found covered with the sands of the desert; around them there once bloomed fruitful fields. To those farmers who reside in districts and on farms where the timber has been almost annihilated, now is the season to put in practice a useful lesson, viz., to plant beltings of beautiful and useful trees around their farms. Trees equalize the temperature of climates, by attracting clouds in hot weather, to cool the atmosphere with showers; and they shelter houses and crops from high and cold dry winds. And this advice is not only useful for those residing in regions denuded of their forests, but more useful still for our farmers residing on the broad rich prairies of our Western States.

And trees are not only useful as agents of refreshing rains, but they promote health and beautify the landscape. It is a settled question, we believe, that they absorb miasma from the atmosphere; and certainly a treeless landscape is as dull as a tenantless house. Many of our farmers have an eye to the beautiful in the selection of trees for the grounds around their houses, but few of them seem to have paid proper attention to the laying out of their farms. In directing their minds to this subject at the present time, we hope that considerable good will be the result. We do not mean to suggest what kind of trees they should plant, as these should be varied for the locality, soil and climate, but we advise them not to fail in planting some kind.

## AYRES' WATER ELEVATOR.



The utility of a device which can enable an animal, by slightly depressing the platform on which it approaches, to draw up from a well a plentiful supply of drink, is too obvious to require remark. The labor of pumping a sufficient quantity daily to supply a large amount of stock is very considerable, and may frequently prevent the location of wells in many pastures, where, with a self-acting device for raising the fluid by the weight of the animals themselves, such supplies of water would be highly serviceable.

The accompanying cut graphically delineates the general arrangement of a self-acting water elevator for this purpose, designed by J. A. Ayres, of Hartford, Conn., and its operation will be readily understood from a brief description.

The bucket, B, steadied by light guides, *r r*, is suspended by the rope, *e*, which latter is coiled on the large wheel, A. On the same shaft with A are mounted smaller pulleys, C C, on which ropes are coiled, which are attached to one edge of the platform, P. The opposite edge of this platform is hinged, so that it may rise and fall, to some extent, and the weight of the bucket is sufficient, by its descent, to raise the platform when unloaded, but when a large animal steps on P its weight is sufficient to revolve the wheel and raise the bucket, bringing up considerably more water than it can consume, and keeping the trough always full and running over, unless sheep, or other very light animals are supplied in addition.

The coiled spring, *a*, is provided as represented to check the ascent of the bucket, which might otherwise rise too suddenly against the frame, F, under the violent and irregular movement of heavy cattle. It is well also to place elastic material, such as turf, old straw, brushwood, or the like, under the platform, with a view partially to check its descent. We have represented the device in its simplest form, a small spout, *d*, being permanently open to admit the entrance and escape of the water, the flow being inward to fill the bucket when at the bottom, and outward into the spout, S, leading to the trough, T, when at the top of the well; but this arrangement allows the vigorous escape of the water through all the intermediate hights, so that much is necessarily lost; and Mr. Ayres' invention provides a self-acting faucet, (not represented) which is always open when at either the top or the bottom, but which remains closed in moving through the intermediate points. For this purpose the pipe, *d*, is made very short, or removed altogether, and a lever hung on a pin by its side, so that when freely suspended it will assume a nearly horizontal position, so as to stand across the mouth of the opening, and check the escape. This lever, pivoted in the middle, has affixed to one extremity a buoy of wood or cork, so that on dashing into the water in its descent, it will be raised at that end and uncoving the aperture will allow the bucket to be filled. The other extremity of the lever comes into play when the bucket is raised to the full hight required, as it then comes into contact with a fixed pin on the framing, and inclining the lever to the same extent as at the bottom, uncovers the orifice to allow the free discharge. By this simple device all the ends to be desired are effectually attained, so far as certainty of action by the weight of heavy animals can do this; and it will be seen, on a little further thought, than even an animal too light to raise the full bucket, will, by inducing a considerable pull on the bucket, and by consequently raising it a trifle in the water, induce the contents to escape freely through the open hole until it becomes light enough to rise rapidly to the top.

Farmers and others wishing further particulars can obtain circulars, etc., by addressing the proprietor of the invention, Henry A. Dyer, Hartford, Conn. The patent was dated April 15th, 1856.

### Restoring Oxydized Bronze Figures.

Some ancient bronze statuettes, and other works of art, have become so oxydized as to be perfectly brittle, like the rotten brass sheathing of ships. Chevreul, the eminent French chemist, has succeeded in restoring such works to their original malleable condition, and has communicated an account of his experiments in a paper to the Paris Academy of Sciences. He placed a small but completely oxydized statuette in a porcelain tube filled with hydrogen gas, then raised it to a dull red heat, and took out the figure. It was found to be completely revived—the oxygen expelled, and the figure reduced to solid metal.

Some ivory figures obtained by Layard in old Ninevah were found to be brittle, (rotten) but in perfect form. They were sent to Prof. Owen, in England, who revived them by immersion, and then boiling in gelatine. The ingenious discovery of Chevreul reminds us of the important one of the English Professor.

### Evaporation of Salt and Fresh Water.

Prof. Chapman, of Toronto, Canada, has made experiments on the evaporation of salt and fresh water, and has come to the conclusion that the great object of salt in the sea, is to regulate the amount of evaporation. He says:—"If any temporary cause render the amount of saline matter in the sea above its nominal value, evaporation goes on more and more slowly. If this value be depreciated by the addition of fresh water in undue excess, the evaporating power is the more and more increased. The experiments were made on weighed quantities of ordinary rain water and water holding in solution 2·6 per cent. of salt. The excess of loss of the rain water compared with the salt solution was, for the first twenty-four hours, 0·54 per cent.; at the close of forty-eight hours, 1·04 per cent.; after seventy-two hours, 1·46 per cent.; and so on in increasing ratio."

### Wall Paper Poisonous.

Dr. Hinds, of Birmingham, Eng., has lately called attention, through the London *Lancet*, to a method of accidental arsenical poisoning which should be generally known, and from which he was himself the sufferer. He chanced to select, for the adornment of his study, a particularly bright tinted wall paper, the pattern of which was confined to two shades of green. About two days after it had been applied he first used the room in the evening, sitting there and reading by a gas light.—Whilst thus engaged he was seized with severe depression, nausea, abdominal pain, and prostration. The same chain of symptoms ensued on every subsequent evening when he occupied the room. This led to an inquiry into the cause. He scraped off a little of the bright coloring matter from his pretty green paper, and, by sublimation, produced abundant crystals of arsenious acid. The paper was colored with arsenite of copper (Scheele's green). Dr. Hinds remarks that the presence of the arsenical pigment may be recognised by its brilliant and beautiful hue, and by a little running of the color at the edges of the pattern, as though it did not take freely to the paper.

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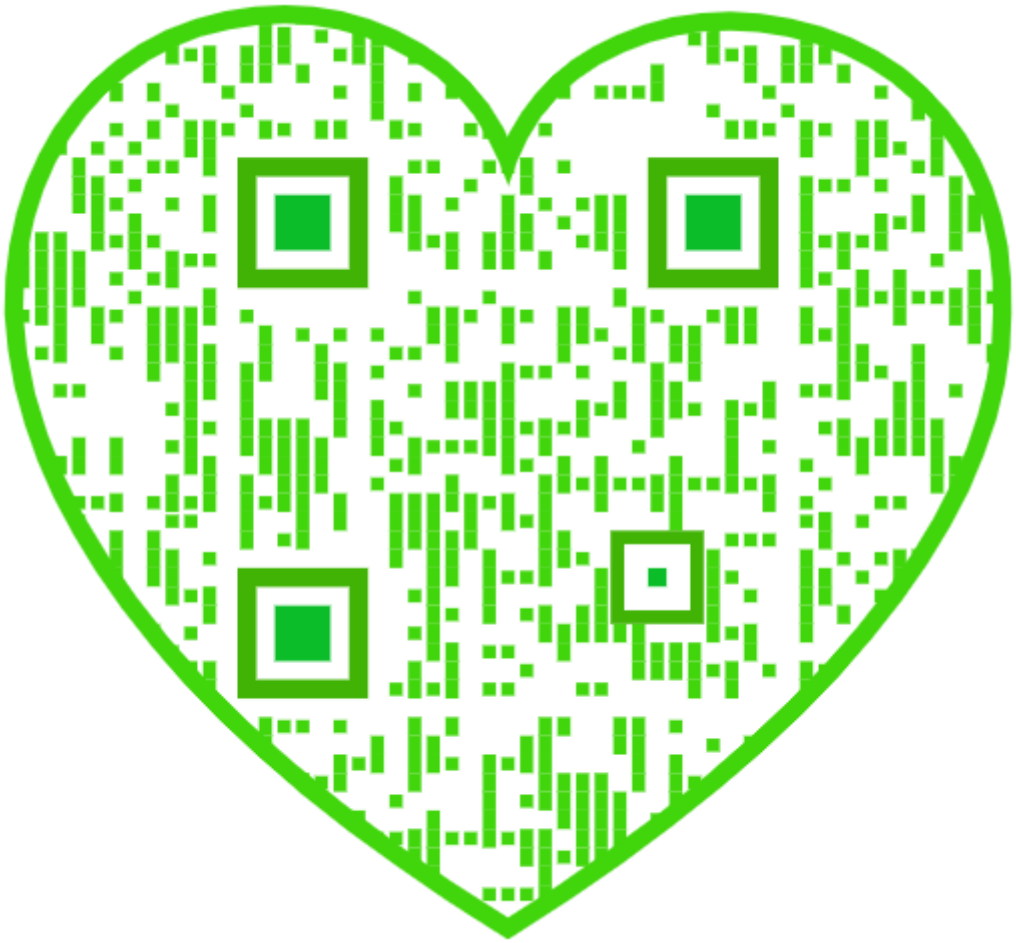

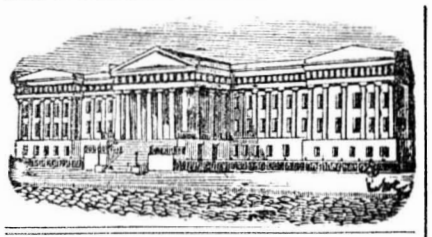

[Reported officially for the Scientific American.]

# LIST OF PATENT CLAIMS

## Issued from the United States Patent Office

### FOR THE WEEK ENDING MARCH 31, 1857.

PLOWS—Elliot Andrus, of Geneva, N. Y.: I do not claim the invention of the plow, nor the iron beam, mold board, or shear.

Neither do I claim the cam wheel.

But I claim the frame, E E', for the purpose of holding the mold board, B, attaching the handle, P', and supporting the end of the wheel shaft, s.

I also claim the manner of attaching the mold board upon pivot points, in combination with the lock d d', and links, L L.

I also claim the combination of the wheel, W, cams, a a1 a2 a3 a4 a5, and friction roller, b, or their equivalents, to produce the oscillating motion of the mold board, in the manner and for the purpose substantially as described.

GRADE DELINEATORS—Geo. R. Clarke, and Samuel Adams, of Antioch, Cal.: We claim, first, the use of the pendulum, L, or its equivalent, operated upon by gravitation, in combination with the cones, C D E, and the friction wheels, G and H, or their equivalents.

Second, we also claim, in combination with the pendulum, L, and the cones, C D E, the arrangement of the arms, a b c, the bars, d e f, and slides M, to move the friction rollers along the cones, substantially as above described.

Third, we claim combining the pendulum, L, or its equivalent, with the paper rolls and grade pen, or either of them in such a manner that their respective motions, as set forth, may produce correct horizontal and vertical scales, or a profile of the ground traveled over by the carriage.

YARNS FROM MIXED COTTON AND WOOL—Geo. S. Bradford, of Sandlake, N. Y.: I do not claim the mechanism employed for covering a cotton drawing with wool.

But I claim carding through the finisher, as specified, the drawing made by covering an evenly prepared cotton drawing with wool, as described, thereby leaving most of the wool on the outside of the finished roving without carding the cotton through any wool carding machine but the finisher, and hence leaving the staple of the cotton straight in the finished rovings, as set forth.

BOATS—Robert C. Buchanan, of Baltimore, Md.: I claim the portable boat, as described, the same consisting of the portable skeleton frame work and unprepared canvas, secured to the frame work by lashings, in the manner set forth.

STEAM DRYING CYLINDERS—John Booth, of Pawtucket, R. I.: I claim the arrangement of the steam and waterpipes at one end of a drying cylinder, in the manner and for the purpose substantially as described.

[A portion of the steam employed in drying cylinders is condensed into water; this is commonly carried off by gutters, which only operate when the cylinder is in motion. The employment of a syphon in the journal of the cylinder (as here claimed) carries off the condensed water constantly; while by taking the heating steam pipe through into the syphon the use of one stuffing box is dispensed with—two being necessary by the old method. This is a good improvement.]

CORN CULTIVATORS—John B. Baker, of Onondaga, N. Y.: I am aware that cultivators have been made with adjusting bars before and behind, whereby the teeth may be adjusted in a manner similar to mine, and I do not, therefore, wish to be understood as making any claim to the adjustment.

But I claim the arc or fender, E', in combination with the adjusting bar, E, whereby the stalks are laid aside, and the said bar rendered much more durable, the whole constructed as set forth.

GANG PLOWS—Jesse Frye, of Springfield, Ill.: I claim the so hanging of a gang or series of plows upon their stock and beam as that the conductor upon his seat may, by a system of hand levers and connecting rods, substantially such as set forth, adjust said series of plows to any desired depth or width of furrow, as set forth.

BRICK MACHINES—Jas. A. Doer, Ira Hersey & Edward G. Oldfield, of New York City: We claim the combination of the cams, L L, eccentric, R, and slotted projection P, attached to strap Q, with the rollers, K K, beam, I, and lower pistons, J J, when said parts are constructed and arrranged in the manner and for the purpose set forth.

LOCK—V. R. David, of Newark, Ill.: I claim the bar, E, with projection, e, attached, in combination with the slide, a, fitted within the slotted chamber, C, the above parts being arranged and used in connection with the bolt, G, as described for the purpose set forth.

[It is extremely difficult to convey an idea of this improvement without a diagram Suffice it to say, that by the use of a stop applied to the lock—which stop is arranged and operated in a peculiar manner—the bolt of the lock is prevented from being moved till the stop is moved from it, and thus the lock is rendered very difficult to pick.]

SLEEVE BUTTONS—John P. Derby, of Boston, Mass.: I do not claim the movable arm, P, or the joint by which it is attached to the fastener, as I am aware that the eye of button or clasp has been constructed with a movable part which opened inward; such forms no part of my invention.

But I claim the lever, V, which is used by increasing the distance between the joint, R, and the face plate, K, by the means of a post, S, so shaped that the arm, P, can be raised and depressed, substantially as described, said arrangement allowing the fastener to be entirely operated from the face side, in securing it to and detaching it from the wristbands.

BULLET MOLD—Henry L. DeZeng, of Geneva, N. Y.: I claim the movable cam jaw, B, in combination with the cutting bar, C, constructed and operating substantially as specified, whereby the movable jaw is held to the stationary jaw while the bullet is being cast by forcing the handles apart, and on pressing the handles together the projection from the bullet is first cut off, and then the movable jaw is thrown back to discharge the bullet, substantially as specified.

SEWING MACHINES—James E. A. Gibbs, of Millpoint, Va.: I claim making a series of lock stitches, with a double hook reciprocating its motion of a single revolution or part of such revolution, substantially as set forth.

I also claim in combination with a sewing machine, the hollow thread case, of a spherical, oval, or any other similar form, for containing a ball of thread, having no fixed axis of revolution.

I also claim attaching to the globular thread case, a plate, or its equivalent, furnished with two hooks, which are placed symmetrically in the manner specified, and combining the whole with any suitable mechanism that will impart thereto a reciprocating motion of a single revolution, or part of such revolution, when the axis of revolution is fixed substantially as set forth.

DRY GAS METERS—Hyam Jacob Hyams, of Russia. Patented in England Feb. 16, 1856: I do not intend to confine myself to the exact form and arrangement of parts shown and described, as they may be varied without departing from the nature and object of my invention.

But I claim the connecting together the rigid parts of the movable diaphragms, substantially as specified, in order that they may act together, as described.

I also claim the construction and arrangement of the rotating circular valve, as shown.

ROTARY SHINGLE MACHINE—Edwin Edwards, of Oneida Lake, N. Y.: I am aware that devices have been employed for shifting the position of the bolt at each cut of the knives, so that the shingles can be cut in taper form, and the butts cut alternately from each side of the bolt. But the devices hitherto employed have been complicated, expensive to apply to the machine, and liable to get out of repair.

I claim the employment or use of the adjustable annular gages, G H, formed each of two parts, b c d e, and applied to the wheel B, as shown and described, for the purpose set forth.

[This improvement relates to rotary cutting shingle machines. Two annular and concentric gages are attached to the face of the wheel, and are so arranged and made adjustable that as they rotate they cause the bolt of wood to be presented angularly to the cutters, whereby the shingles are cut of a proper taper form from it. Each cutter acts alternately, and cuts a shingle from opposite sides of the bolt. It is an excellent improvement.]

CREASING PLATES FOR R.R CAR SPRINGS—Perry G. Gardiner, of New York City: I claim the use of the V-shaped roller, T, and flat faced roller, N, for creasing the plates, as described, when operating in connection with the carriage, W, the plates, S, and guide or stop plate, a, in the manner and for the purposes specified.

DISENGAGING R.R. CAR SPRINGS FROM MANDREL—Perry G. Gardiner, of New York City: I claim the peculiar construction of the disengaging tool, L, and the manner of constructing the platform, M, when operating in connection with spindle S, for detaching the coil, in the manner described.

SHOE LAST—Alanson and William P. Haskell, of North Brookfield, Mass.: We claim the use of the concave head in connection with the adjustable guides and rest, when constructed and operating substantially as described.

Second, we claim so constructing and hanging the bent lever, or its equivalent, as to allow the same pattern to be used for the different sizes, the position of the pattern governing the size, substantially as described.

Third, we claim the combination of the lever, J, plate, i, and cutter head, when constructed and operating substantially as set forth and described.

COMPOSITION FOR FLOOR CLOTHS—JOS. W. Harman, of Brooklyn, N. Y.: I claim the use of this compound or the application of the same to the making and manufacturing of floor cloth carpets, substantially as set forth.

STEAM CARRIAGE—John S. Hall, of Pittsburgh, Pa.: I claim, first, so combining and arranging the driving machinery and body of the carriage with the wheels and axles as described, so that the latter may be both swiveled, moved, or adjusted in any and all directions, without in the least changing the relation of all parts of, or otherwise affecting the said driving machinery, or body of the carriage.

Second, the stationary, universal driving bearings or boxes, H2 H2, or their equivalents, whereby the axles and wheels may be readily rotated or driven in all their variable relative positions, with the driving machinery and body of the carriage.

Third, the double ratchet wheel, i, in combination with the pawls, K and n, and spiral spring, constructed and operating as set forth.

HINGE—R. Hart, of Marietta, Ohio: I claim the employment of the arms or levers, D E, constructed, arranged and operating substantially in the manner and for the purpose set forth.

I also claim, in combination with the movable arms or levers, D E, the lever, F, constructed and arranged with a shifting pawl, and operating substantially as shown.

CORN HARVESTERS—Abram Heulings, of Philadelphia, Pa.: I claim the combination of the tilting platform, P, the gates, b c, curved arms, d, and swinging links, e, with the rock shaft and its operating lever and rod, when said parts are arranged for joint operation substantially as described.

CUTTING SLOTS IN CLOTHES PINS—John Humphrey, of Keene, N. H.: I do not claim the saw, the inclined spout, or the means of securing the pins for the action of the saw, separate from the holder.

Neither do I claim a sliding holder, irrespective of its construction.

But I claim, first, a holder so constructed that the pins may be received into a grove or chamber behind the part in which they are secured, for the action of the saw, and then driven forward by a driving rod, or its equivalent, to the proper position for the cutting of the slots, the same being stationary, or having a reciprocating motion, as described.

Second, I claim, in combination with the holder the saw, the inclined spout, and the dog, H, or their equivalents for the purposes set forth.

HUSKING CORN—Abraham R. Hurst, of New Cumberland, Pa.: I claim the employment or use of the sliding jaws or plate, C, lever, E, and plate or disk, F, the jaws or plates, C, being connected to the lever, E, by straps, D, and the jaws or plates, C, placed or fitted on on the bed piece or platform, B, the above parts being arranged substantially as shown, and used in connection with the knife or cutter, p, for the purpose set forth.

[In this corn-husking machine the ears are held between the self-adjusting spring plates, and their butts are cut off with a knife. When each butt is cut off the ear is forced out from between the plates, which hold the husks firmly, and thus the husks are stripped off cleanly. This is a very effective and ingenious husking machine.]

CARRIAGE TOPS.—R. S. Jennings, of Waterbury, Conn.: I do not claim having carriage covers to fold up into a smaller compass, or in a manner to reduce their length by falling back.

Neither do I claim having them to fold, so as to reduce their hight by means of a joint in the vertical portion of the front bows, as in Scripture's arrangement.

I claim the employment of a transverse hinge joint, b, on each of the bows, B C D, at the center of their top or horizontal portion, in combination with staples, d d, and two [illegible] of bars, c c c c, which are pivoted at one end to the front bows, and at the other end are each provided with a slot, e', and furnished with a hook, e, substantially as and for the purposes set forth.

[By this improvement a carriage top is so constructed that it can be readily put on and taken off a vehicle, and then compactly folded when not required for use. Such a top can also be expanded and adjusted to suit the seat of the carriage. It is a good invention.]

BEE HIVES—Albert Kelsey, of Westport, Mo.: I am fully aware that sash frames have been used in the working chambers of bee hives. These I do not claim

But I claim in combination with the double chambers of sash frames, the two walls with communicating passages through them, when said walls or partitions are so arranged that a slide or cut off can be introduced between them, for the purpose of an entire separation, as set forth.

MAKING PASTEBOARD—Louis Koch, of New York City: I claim, first, the arrangement of the roller, E, in connection with the arm, G, and projection or screw, O, for the purpose of operating the lever, R, by which the slide P, is held fast or set at liberty when the board has obtained the required thickness, together with the arrangement of regulating, by means of said screw, o, the required thickness of the pasteboard, in the manner specified.

Secondly, I claim the movable slide, P, or its equivalent, constructed and operated as described, and for the purpose of cutting or tearing and lifting the pasteboard which was formed on the roller, A, from said roller after the same has obtained the required thickness.

Thirdly, I claim the arrangement of the movable frame, S, with leather, or its equivalent, attached, for the purpose of stripping off the cut pasteboard from the end of the slide, P, the whole being operated in the manner as specified.

PRESSING WATER OUT OF PASTEBOARD—Louis Koch, of New York City: I claim the combination of the pressing rollers, in connection with the rollers, N M and N' M' arranged with endless felts, in such a manner that the board shall be made to pass between the pressing rolls between two thicknesses of felting, to allow the water contained in the board to be pressed out of the same without injuring the board during the pressing process, the whole being arranged in the manner and for the purpose described.

PRAIRIE PLOWS—Jesse Frye, of Springfield, Ill.: I claim, first, supporting the after end of the plow beam, A upon a vertical journal at the left hand end of the axle, T, when the bearings at the opposite end of said axle are so arranged that the position thereof may be varied and adjusted, substantially in the manner and for the purpose set forth.

Second, I also claim arranging the bearings of the rollers, e e e f and g g g, in such a manner that their positions may be varied and adjusted, substantially in the manner and for the purpose set forth.

Third, in combination with the mold board composed principally of the series of adjustable rollers, as set forth, I also claim the adjustable triangular plate, w, for the purpose of making the whole conform to the position in which the furrow slice is to be laid or turned, substantially as set forth.

SEED PLANTERS—Geo. A. Meacham, of New York City: I claim, first, the box, B, provided with the elastic side, a, and the head, C, or its equivalent, for the purpose of distributing or measuring the seed,

Second, I claim the planter attached to the foot of the operator, and formed of the boards, F G G, connected by the elastic straps, e e', the boards, G G having the plates, H H, attached to them and the under side of the board, F, the plate, I, attached, the whole being arranged substantially as described, for the purpose of planting and forcing the seed into the soil by the pressure of the foot.

[This invention was illustrated on page 161, this Vol., Scientific American, and is the second patent issued to Mr. Meacham for such planters. A full description of this ingenious planter will be found on the page referred to.]

PREPARING YARN—Lucien E. Pratt, of South Kingston, R. I.: I do not claim the use of this or any other particular machine, for the purpose of forming the described muff or body of the yarn, as the same might be done on a reel, by having a suitable guide so constructed and arranged as to move a suitable distance along the reel alternately, or other different devices might be used for producing the same effect.

I do not claim winding a single thread in helices crossing one another, as is done in the formation of cops or balls of sewing thread.

But I claim in making muffs of thread or yarn to be dyed or otherwise treated, as described, my improvement consisting in winding a series of threads, each separated from, or at a distance from the other, in one helix band around a cylinder or drum, and so that the coils of each layer of such on the cylinder, may cross those of the next layer, substantially as described.

CORN PLANTERS—John Miller, of Bucyrus O.: I do not claim the perforated and reciprocating sides, f f, for measuring and distributing the seed and gypsum, or lime, for they are well known and commonly used.

But I claim the auxiliary compartment, d, having a slide, f', acting simultaneously with the seed slide, f, arranged and operating as described, for the purpose of designating the point of planting, as set forth.

[This improvement embraces the rendering visible of the places where the seed is deposited. Through an entire field the seed may be planted in parallel lines at equal distances apart. Two hoppers—one containing seed, and the other lime or gypsum, of a color contrasting with the ground—are operated at once, the seed is deposited in the furrow, and a little lime at the side of it, to render visible the spot where the seed is planted. The depositing device is under the control of the driver.]

SECURING BITS IN THEIR STOCKS—A. C. Moore, of Wilmington, Vt.: I claim the application to bit stocks of a plain socket with a screw cap to hold the bit in place by a pressure upon the shoulder of the bit head, thereby doing away with the necessity of fitting a bit before use, and gaining the advantage of a sure and firm fastening.

CENTERING AND HOLDING HUBS WHILE BEING BORED—Albert Moore, of Honeyoye Falls, N. Y.: I claim first, the construction of the chuck, consisting of the combination of the ring, R, and arms, d d d, said arms moving as described upon the fixed and movable points, P P P, and c c c.

Second, I claim the arrangement of the frames, E and F, in the manner and for the purpose substantially as described.

HARROWS—John E. Morgan, of Deerfield, N. Y.: I do not claim the connection of the two parts of the harrow, by means of the rod, F.

Nor do I claim the sliding or horizontal movement allowed upon this rod, as described, without the use of the vertical movement.

But I claim the providing for the vertical action between the two parts of the harrow, by means of the coupling formed by the use of the vertical enlongated links, E, operating on the rod, F, or its equivalent, as described.

ENEMA SYRINGE—C. H. Davidson, of Charlestown, and H. E Davidson, of Gloucester, Mass., assignor to C. H. Davidson, aforesaid: We claim the combination of the prolate spheroidal-shaped elastic sac, with flexible tubes terminating in valve boxes, containing valves, arranged for the purpose of eduction and ejection, when the sac tubes and valve boxes are in or nearly in the same axial line, the whole operating together, substantially in the manner and for the purpose set forth.

STEAMBOAT CAPSTANS—John Schaffer of Manchester, Pa.: I do not claim the parts driving or driven, as separately considered.

Nor do I claim a capstan with a barrel divided into two or more drums, rotated upon a stationary shaft.

I claim a capstan, the shaft, C, of which rotates within the drums, D and E, which can be rotated separately or in conjunction with and by, or independently of, said shaft, substantially in the manner and for the purposes described.

TURNING IRREGULAR FORMS—W. D. Sloan, of New York City: I claim the series of rotating and shifting mandrels for rotating the blocks to be turned, and shifting them from one operation to another, substantially as described, in combination with the series of traversing cutters, guided by patterns, or molds, to determine the form to be produced, substantially as described, whereby a series of blocks are simultaneously subjected to the series of operations, and each in succession subjected to all the operations, as set forth.

I also claim the mode of operation, substantially as described, of the cutter, termed the finishing cutter, which said mode of operation consists in rolling the cutting edge along the surface of the block that is being turned, as described, by reason of which a small portion only of the cutting edge is cutting at any one time, and immediately relieved and followed by another portion of the said cutting edge, as set forth.

I also claim the sliding segment ring with its slots, substantially as described, in combination with the cutters and their appendages, substantially as described, for carrying the rangling cutters nearer to the axis of the blocks at each successive cutting action, as set forth.

STEAM PLOWS—D. B. Spencer, of Parkersburg, Va.: I claim, first, the use of the single wheel at the rear of the carriage, as the sole driving wheel, and running in the bottom of the furrow turned by the plow, substantially in the manner described.

I also claim hanging the two supporting wheels eccentrically on the same turning or rocking axle, so that whether the machine runs upon level ground or with one wheel higher or lower than the other, the frame and boiler shall still preserve its horizontal position, as set forth.

CONSTRUCTING BIT STOCKS—A. W. Streeter, of Shelburne Falls, Mass.: I claim the construction of a bit stock in sections, said sections being connected by joints in the manner and for the purposes substantially as set forth.

I also claim the mode of attaching the stock cap to the stock, by means of the box or tube, G, and cross pin D, or its equivalent, substantially as described.

FLUID METER—James Cochran, of New York City: I claim, first, in combination with a tilting measuring vessel or its equivalent, enclosed within an air tight vessel, a secondary air tight vessel, connected with the former, substantially in the manner and for the purposes described.

And I claim combining with a measuring vessel, treated in and combined with an air chamber, an apparatus substantially such as is described, which shall from time to time introduce portions of the outer air into the interior of the air chamber, the whole being and operating substantially in the manner and for the purposes specified.

STOVES FOR RAILWAY CARS—G. W. Thompson, of Bordentown, N. Y.: I claim the balanced valve, v, as hinged to the interior of the pipe, I, in combination with the lever, h, levers j and j', their disc, I, and the perforations in the cap, B, the whole being arranged and constructed substantially in the manner and for the purpose set forth.

SHAPING ENGINES—S. J. Wetherell and E. P. Morgan, of Biddeford, Me.: We do not claim, for the purpose of feeding the main carriage along on its ways, a long revolving male screw, turned by a pawl and toothed wheel movement, (arranged at one end of the machine,) and made to revolve in a female screw fixed and made stationary on the main carriage.

Nor do we claim, for the purpose of turning the revolving mandrel, a rotary splined shaft, and an endless worm or screw made to work in a worm gear fixed on the mandrel, all the same making parts of the well known Whitworth's patent universal shaping machine.

But we claim to make the screw, S, a stationary male screw, and the female screw, c (attached to the carriage D, and made to work on the screw, S,) a rotary screw, and to combine with them and the gear g, (by which and the gear, X, the shaft, T, is rotated,) the gears Y and h, (the latter being made to rotate on the shaft, i, and to be fixed to the former, as occasion may require, by a pin K, or its equivalent,) a rocker arm, r, and double pawl, u, (or mechanical equivalents therefor,) applied to the shaft, i, and operated essentially as described, the whole being to enable a workman to control the operations of the machine as stated, without being obliged to go to the end of the frame, or leave his work in order to adjust or change the feed motion of the cutting tool, whether it be planing either plane or cylindrical work.

RAKING APPARATUS FOR HARVESTERS—Jesse Urmy, of Wilmington, Del.: I am aware that rakes have been constructed and operated with a rake bar similar to mine driven by a crank, and having its rear end working around a stationary stud, and I do not lay any claim to such an arrangement.

I am also aware that the upper end of the rake bar has been governed by a connecting rod attached to a stationary point or fulcrum, and do not therefore wish to be understood as laying claim to any such arrangement.

But I claim operating the rear end of the rake, A, by means of a crank, D, when said crank moves with the pin that operates the rake bar, C, in combination with the connecting rod, b, and adjusting holes, v v, and y y, the whole being constructed and arranged in the manner and for the purpose set forth.

BABY JUMPERS—M. J. Wellman, of New York City: I claim the combination of the cross and corner springs attached to separate points of suspension at a distance from the center, and beyond the center of gravity with an infant's seat, constructed, arranged and combined in the manner and for the purposes set forth.

FEATHERING THE SAILS OR VANES OF WIND MILLS—J. C. and F. G. Wilson, of Cedar Hill, Texas: We claim the combination of the traversing screw, m, having stops e and f, as described, with the slide piece and rods leading to the wing, the construction and arrangement being substantially as and for the purposes described.

GUNPOWDER KEG—Jas. Wilson, Chas. Green and Wm. Wilson, Jr., of Brandywine, Del.: We do not claim the mere giving strength to metal by corrugating it, as that effect is well known.

But we claim the making the side or cylinder of corrugations, a a a, and bulge or swell B, when employed with the extra ring or boss, D, and head, C, for the purpose of greater strength and more convenient handling as set forth.

LIFE PRESERVING BEDSTEADS AND SOFAS—J. T. Garlick, of New York City: I claim the air and water tight bedstead, settee or sofa, constructed and arranged in the manner described, and for the purposes set forth.

COMPOSING AND DISTRIBUTING TYPE—W. H. Houston, of Belfast, Me.: I claim, first, the described machine for composing types, operating in the manner substantially as set forth.

Second, The method described of selecting the types from the cases by means of the springs, n, or their equivalents, operating in connection with the keys, O, in the manner substantially as set forth.

Third, The method of transferring the types to the stick by means of the plungers, B and T, or their substantial equivalents, as set forth.

Fourth, I claim raising the rule, Y, and throwing forward the line of type upon the galley by the means described, or by any means substantially the equivalent thereof.

Fifth, I claim the method of feeding forward the types in the cases by means of the slipping bands, f, rods j, and cylinder K, or their equivalents, operating in the manner substantially as set forth.

Sixth, I claim the wheel, F 2, with its ratchet wheel, M 2, and the connections, N 2, O 2, d 2, or their equivalents, whereby this wheel is caused to give motion to the shaft, C, whenever any one of the keys is depressed as set forth.

Seventh, I claim the described method of connecting the crank, U, with the pitman, W, by means of the springs, f, operating as set forth.

Eighth, I claim the distributing machine, constructed, arranged and operating in the manner substantially as described, by means of which a column of type when placed in the machine is distributed automatically in the manner set forth.

Ninth, The method described of forwarding the types to the trial case by means of the vibrating case, t 3, operating in the manner substantially as set forth.

MACHINE FOR WASHING GOLD—S. S. Lewis, of San Juan, Cal.: I claim the employment of riffles or bottoms, constructed in the manner substantially as described, so that an under current of water may be used between the ribs, in connection with that flowing over the surface of the bars of the riffles, in the manner and for the purposes set forth.

MANUFACTURE OF PAPER PULP—C. F. Sturgis, of Carlowville, Ala.: I claim the described process of manufacturing paper pulp from the bark of the root and the bark of the stalk of the cotton plant.

PAINT BRUSHES—J. T. Steer, of New York City: I claim the use of the binding ferule, C, for the purpose of effecting, as described, the introduction of the bristles into the cap ferule, E, the said cap ferule being made in one piece, with its cap and shank, as described, for the purpose of making an improved paint brush, as set forth.

GAS REGULATOR—C. J. Halstead and John Coeyman, of New York City, assignors to Decker, Godine & Halstead, of same place: We are aware that a double compensating valve, actuated through the pressure of gas on a flexible diaphragm, has been used in a regulator. This we do not claim.

But we claim a gas regulator, to be located between the meter and main gas pipe, and composed of the perforated plate, B, having a flange upon it provided with external and internal screw threads, and a plate, D, similarly perforated and provided with a screw which runs into said internal screw thread on the plate D, and adjustable therein by its stem, H, when said plates are combined with a single valve, C, and adjustable spring, E, and the whole arranged within the shell, A, substantially in the manner and for the purpose set forth.

PRINTING FROM ENGRAVED PLATES—Linus Stewart and Jno. McClelland, of Washington, D. C., assignors to David and John McClelland, of same place: We claim heating the plate from which the impression is to be taken, by means of a hollow bed plate, into which steam is admitted, substantially as described.

We also claim the cleaning of the plate by means of a horizontally revolving cleaning apparatus, in which a clean surface is constantly brought into contact with the plate, at every revolution of the cleaner, substantially as described.

We also claim, in combination with the fingers or nippers, the cam and spring, which alike hold them, whether open or closed, substantially as described.

BASKET MOLD—J. A. H. Ellis, of Springfield, Vt., assignor to Joel Woodbury, of same place, Trustee, &c: I claim the basket mold, constructed substantially as described, viz., of a block or former, A, made with annular and top recesses, and provided with a shoulder ring, C, hoop catches, F F, and the bottom clamping plate and screws, or equivalents therefor, the whole being used in the manner and for the purpose as specified.

CUTTING THE THROATS OF CARPENTERS' PLANE STOCKS—Henry S. Dewey (assignor to himself and L. W. Newton,) of Bethel, Vt.: I claim the combination of the shaft path cutter, H, the plane iron and wedge throat cutter, I, the movable carriage, A, and the adjustable bearer, L, by which the inclinations of the ends of the throats may be obtained, as described, the whole being in manner and for the purpose as specified.

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TABLE KNIVES—Conrad Poppenhusen and C. F. E. Simon, of College Point, N. Y. (assignors to Conrad Poppenhusen aforesaid): We are aware that German-silver knives have been made by fitting the rear end of the German-silver blade to a V-shaped groove in the forward end of the German-silver balance nut, and then uniting them by solder, and we do not wish to be understood as claiming, broadly, the union of the blade with the balance nut by either welding or soldering.

But we claim the mode of procedure described, by which we effect the union of the steel blade with the cast balance nut, whether of malleable or ordinary cast iron by preparing the rear end of the steel blade with cleansed parallel sides fitting a groove with parallel sides in the cast balance nut, preparing the surfaces with borax, or other equivalent flux, and then welding the same by heat and pressure, as described and for the purpose set forth.

RE-ISSUES.

WINDOW CURTAIN FIXTURES—S. S. Putnam, of Boston, Mass. Patented originally April 15, 1851: I claim attaching the curtain to its roll by a piece or strip which fits into a groove in the roll, and is secured thereto by caps at the ends, in the manner substantially as set forth.

PLANING MACHINES—J. A. Woodbury, of Winchester, Mass. Originally patented Feb. 7, 1854: I claim, first, the combination of the rotary disk cutter with the pressers and bed, substantially in the manner and for the purposes described.

Second, I claim the combination of the Bramah wheel, so called, with the rotary disk cutter and its accessories, for the purpose of planing, substantially as set forth.

Third, I claim the method of planing with a continuous drawing cut, substantially as described.

PLATFORM SCALES.—Thaddeus Fairbanks, of St. Johnsbury, Vt. Originally patented Jan. 13, 1857: I do not claim a combination of levers, wherein four platform bearing levers radiate from one common center, and are there suspended to a multiplying lever, connected with an equalizing lever, as I am aware that such is a common method of making a platform scale.

Nor do I claim the combination of a multiplying lever, an equalizing lever, and an equalizing and multiplying lever, as I am aware that such have been employed, and the platform thereof upheld by being made to rest directly on the first and last of said levers.

This differs essentially from my combination and arrangement, as by such I am enabled to employ an additional series of levers, viz., the transverse levers, C C C, whereby I gain an extra or manifest increase of leverage, and thus render the apparatus useful for determining the weight of railway carriages.

Nor do I claim the employment of a series of transverse and multiplying levers with a lever composed of a long longitudinal shaft, and an arm arranged transversely and projecting from such shaft, the transverse bearing levers of the platform being applied to the long shaft, with reference to its axis, as described.

But I claim my arrangement and combination of four bearing multiplying levers, C C C C, a multiplying lever, E, and a lever, F, made as described, so as to act at the same time as an equalizing and a multiplying lever, the whole being applied to a steelyard weighing lever by means substantially as set forth.

I also claim, arranging the suspension bridge, so that its arched standards shall extend upwards by the sides of of the platform, and between it and the sides of the pit, in manner as stated, in connection with arranging the transverse levers, C C, and their bearings below the platform, the same affording the necessary room for the vertical play of the longitudinal levers, while it secures an advantage as regards the depth of the pit, as stated.

FURNACES FOR BURNING WET FUEL—Moses Thompson, of New York City: I do not claim the described arrangement of a series of fire chambers to communicate with one common flue, irrespective of the purpose for which, and the manner which I employ the said arrangement.

But I claim using green bagasse, wet tan, wet saw dust, and other wet carbonacious or vegetable substances as fuel, for the production of intense heat by mingling the gases issuing from a highly heated mass thereof with those arising from carbonaceous combustion by the intervention of a flue or chamber, with which the chamber or chambers containing the fire and charge of wet substances communicate, and in which said gases meet, mingle and consume each other on their way to the apparatus to be heated, and to the stack.

I also claim the combustion, for the purposes of a high degree of heat, of bagasse, refuse tan, saw dust and other wet refuse substances, or very wet and green wood, by the employment of a series of fire chambers arranged in any manner substantially as described to communicate with one common flue or mixing chamber, when any number of said chambers are nearly closed to the admission of air when first charged as described; whilst the remaining chamber or chambers is in full communication with the mixing chamber, and has a proper supply of air admitted, and the ash pit of each chamber in its turn is nearly closed and then opened, and has air admitted whereby the heat required is rendered continuous and comparatively uniform, while the fuel in some of the chambers is being heated and decomposed, and its gases sent forward to the mixing chamber to any desirable degree, as set forth.

ADDITIONAL IMPROVEMENT

FIRE ARMS—Frederick D. Newbury, of Albany, N. Y., assignor to Richard Varick DeWitt, Jr., of same place. Patented Aug. 12, 1856: I am aware that two or more expanding rings have been used with a loose conical pin, and I do not claim this.

I claim the employment of a permanent cone combined with a ring lying between it and the chamber of the barrel, with a disk fitted upon the ring, the ring being divided on one of its sides by a cut, into which is fitted a pin or wedge, the cone or wedge being so shaped in reference to the ring as to expand it against the charge chamber upon the least re-action of the charge when fired.

DESIGNS.

LEGS AND POSTS OF BEDSTEADS—William Maurer of New York City.

[This new design of a cast metal bedstead is elegant and ornamental, evincing much good taste on the part of Mr. Maurer.]

### Priming in Steam Boilers.

MESSRS. EDITORS—The foaming of water in boilers being the cause of much inconvenience, as well as danger, practical experience should be circulated far and wide in order to discover a remedy. Mr. Battell doubtless assigns a correct reason for its occurrence in some cases, but from my own experience I think it sometimes occurs from other causes.

During the summer of 1856 I had charge of the gang saw mill owned by Mr. Thornton, in the undernamed county, which was then driven with a tubular boiler. The feed water was taken from a stream, which was frequently muddy from rain, &c. We were always greatly troubled by foaming when the water was foul, and always stopped it as soon as the water became clear, by blowing off the water and pumping in clean. In my own mill, with a return flue boiler, I have never known the water to foam, though frequently very impure. A. N. R.

Peach Grove, Fairfax co., Va., April, 1857.

[We have known several cases of the very same kind as those described by our correspondent, of foaming being produced by foreign substances, like dirty water, being introduced into boilers. The introduction of indian meal, potatoes, &c., into a boiler, to stop leakage, causes priming in many instances.

### Heating by Steam.—The Boiler.

MESSRS. EDITORS—The main edifice of the Ohio Female College is warmed by hot air radiated from steam pipes in chambers, and conducted in flues to the rooms and halls. One flue boiler 18 feet long and 42 inches in diameter is used to generate steam, which is taken from the boiler by two 2 inch pipes, and passed through 20,000 feet of pipe of various sizes, from 1-2 to 3-4 inch diameter, and then it is returned through a 1 1-2 inch pipe into a small receiver, from which it is pumped into the boiler while yet boiling hot, and converted into steam again. The circuit, as nearly as can be estimated, is performed from 10 to 12 times in 15 or 16 hours. The pressure by the gage is from 15 to 20 pounds.

Our flue boiler contains about 18 barrels of water, and the tubular boiler which we are advised to use, contains 10 or 12 barrels.

Please inform me if you know of any practical difficulty in the way of generating the quantity of steam in a tubular boiler necessary to keep up a circulation in the 20,000 feet of pipe, besides working a steam pump, warming water for baths, &c.

ELI TAYLOR.

College Hall, O., April, 1857.

[We present Mr. T.'s letter almost in full, because it details quite explicitly one of the methods now in extensive use for heating by steam. There are many opinions on the whole subject, as also on every detail of steam heating. In manufactories driven by steam we are in favor of using large heating pipes—driving *a portion* of the exhaust steam through them. There is no need of compeling all the steam from a large quick-acting engine to blow through the long and narrow passages involved in an efficient system of heating pipes. So long as the pipes are kept filled with steam as fast as it condenses, *and a little faster*, so as to keep up a gentle circulation of pure steam through the whole, unmixed with air, the heating is just as efficient as if the steam were crowded through the pipes at a velocity of some 30 feet per second, to induce which a necessarily great pressure on the exhaust side of the piston must be endured. The quantity induced to flow through the heating pipes may be regulated by a kind of throttle valve or damper, or by any other means which will partially prevent the escape of the exhaust steam through the direct channel.

Many of the large manufactories in the Eastern States are fitted with a light flap valve covering the exhaust pipe for this purpose. When working, the valve stands always a little open, pulsating with each stroke of the engine, but always serving as a check to the extent of about half a pound per square inch upon the escape of the steam, a pressure which is found amply sufficient to drive the steam through properly arranged pipes.

For buildings where heating alone is wanted we admire a system, now beginning to be quite extensively introduced, in which the boiler is in the basement, and the pipes are large, say 2 inches diameter inside, and wherever it is necessary to carry them along on or under a floor, they are laid inclined about 6 inches in 100 feet. The steam trickles back in these pipes as fast as it condenses, so that no special pipe or feed pump is required to return it to the boiler. In this system, also, the lever of the damper which controls the supply of air to the fire is connected to a flexible diaphragm, which latter is lightly loaded, so that whenever the pressure in the boiler falls too low, the diaphragm sinks and opens the damper, and thus quickens the fire; but whenever, on the other hand, the steam gets above the proper point, the diaphragm rises and shuts off the draft.

This matter of regulating the fire leads us back to the inquiry of our correspondent with regard to the relative merits of a flue boiler for this purpose. The general steam generating efficiency of a boiler depends mainly on the amount of fire surface or heating surface it presents to the water within. Either form is capable of being made equally desirable in this respect, or in other words, one is about as likely as the other to make steam in sufficient quantities, and at a moderate consumption of fuel. If anything, the tubular boiler will be most economical of fuel, other things being equal, but it will also require more calking and repairs, and will not last as long finally, so that the gain in this respect will probably be more than compensated; and unless little room can be spared, or some other peculiar circumstances exist to render the tubular boiler desirable, the plain cylinder or the plain flued boiler will prove most advantageous for general stationary purposes. But there is a special advantage in these latter varieties for ordinary steam heating, and this lies in the greater quantity of water contained. The water and the steam-room in a boiler are the reservoirs—the balance wheels, so to speak, which regulate and equalize the production of steam. The large quantity of water and great steam-room in the long flue boiler treasures up the heat when the fire is extra intense, and yields it again when the furnace has been freshly fed with fuel. Were it possible to make a good boiler with no water in reserve, and no steam-room in which the elastic fluid might accumulate, the pressure would run down to nearly to nothing the moment the doors of the furnace were opened. This damper and diaphragm for automatically regulating the steam for heating in the system above referred to, works very well so far as we know, because the steam is kept at a very low pressure—about half a pound per square inch—but the devices which we have seen for attempting the same with higher pressures have failed, either from the great strength and stiffness of the diaphragm, or from its cracking and early rupture.

For steam heating, therefore, by all means employ a boiler with much water and much steam room. Protect it well from the escape of heat by radiation, and it will pour out the steam pretty evenly even if the firing be rather badly attended to. A small tubular boiler of equal power is better perhaps for steamboats, and is almost indispensable for locomotives and portable engines, but is not the thing for substantial, stationary work in general, and especially not for steam heating, unless a man can be actively in attendance to feed and regulate the fire almost continually.

### Inks.

MESSRS. EDITORS—The complaints of poor ink is now becoming so universal that a remedy must be found. A few years since I bought some blank books from as respectable a house as there was in the United States, and ink from a house of nearly fifty years standing, and equally good reputation, and yet the writing fades, which on record books is a fault which can hardly be over estimated.

After a large amount of examination I am satisfied that the fault is neither in the ink or the blank book manufacturers, but in the *paper*. At the paper mills they use strong chemicals to bleach the rags, and before the pulp is suitably rinsed it is run into paper containing chlorine, oxalic acid, oil of vitriol, &c., in sufficient quantity to spoil any ink ever made. I know this to be so, having often sold oxalic acid for the purpose—a substance which, it is well known, will destroy the color of the salts of iron, a very necessary ingredient in all black inks, and having examined the chemical effect of the paper afterwards.

It is my opinion that a blank book manufacturer who would obtain paper perfectly free from those destroying agents—which can easily be tested by any chemist—would command an amount of trade which would well repay the extra expense. H. A. S.

### Hydraulic Cement for Tan Vats.

MESSRS. EDITORS—Your correspondent "J. V., of C. W.," asks what effect will tannin have in water lime, when used to make vats. It will have but little effect if the vats are allowed to remain with nothing but clean water in them until the mortar becomes perfectly hard. Ordinarily the plastering on the inside of the vat will last four or five years, when a new coat may be put on; the mortar in the wall remaining uninjured. I know of one instance where the plastering has remained in good condition for seven years, and bids fair to last as much longer, I speak understandingly in the matter, having built a great many. S. B. E.

Mansfield, Pa., March, 1857.

### Sowing Flax Seed.

MESSRS. EDITORS.—In your notice to correspondents in No. 8, Volume 12, SCIENTIFIC AMERICAN, you advise "W. G. C., of Pa., to sow two bushels of flax seed per acre.

I am aware that in Europe from 2 to 3 bushels per acre is the quantity generally sown. In the counties of Rensselaer and Washington, N. Y., considerable quantities of flax are sown for the fiber as well as the seed, and from 1 bush. to 1 bush. and 2 lbs. per acre is found to be more profitable than a larger quantity, both as regards the quantity of seed, and quality and quantity of fiber. I am informed by reliable parties that the same holds good in Ohio; however, if your correspondent, F. G. C. intends raising flax, and the business is new to him, it would be well for him to experiment a little; say select an acre and a half, and divide it into three equal parts, and sow, respectively, one-half, three-quarters, and one bushel to each part. The experiment would not cost much, and may save him considerable if he means to make flax-growing a business in future.

GEO. ANDERSON.

Lansingburgh, N. Y., March, 1857.

[Mr. Anderson is an experienced flax manufacturer, and his advice is worthy of being followed, not only by W. G. S., but others who have cultivated flax. We advised the sowing of two bushels of flax seed to the acre—for fiber—because that was the quantity we had known to be employed with good results in one of the midland counties of New York.

### Elastic Horn.

The London *Artisan* describes an invention for softening horn and rendering it elastic like whalebone. The horns are cleaned, split, opened out and flattened, and immersed for several days in a bath composed of five parts of glycerine and one hundred parts of water. They are then placed in a second bath, consisting of three quarts of nitric acid, two quarts of pyroligneous acid, twelve and one-half pounds tannin, five pounds bitartrate of potash, and five pounds sulphate of zinc, with twenty-five gallons of water. After receiving this second bath it will have acquired a suitable degree of flexibility and elasticity to enable it to be used as a substitute for whalebone for certain purposes.

### Curves

There are means of mathematically drawing and of rigorously estimating the properties of various curves, which at first seem governed by no laws. There are arcs, elliptical curves, parabolic curves, hyperbolic curves, elastic curves, cycloidal curves, spiral curves, volute curves, catenary curves, and helical curves—each susceptible of being made in an infinite variety of proportions, yet differing from either of the others in fundamental properties. Mathematics is one of the most useful studies for mechanics. It can only be made attractive to some, by showing its application to such tangible subjects as computing forms and strength of materials, etc., and the properties of curves rank among the very highest applications of arithmetical and algebraical powers

### The Amount of Air We Breathe.

By a machine constructed for the purpose, Dr. Donni, of Paris, has made a series of experiments to determine the amount of air required for breathing, by human beings. By these he, as stated, has ascertained that the average amount of air required by persons of ordinary form and good health, from the ages of 15 to 35 years, is from 183 to 198 cubic inches per minute; and from the ages of 35 to 60 years, from 122 to 153 inches—the amount being largely exceeded or diminished in exceptional cases.

Double-acting pumps do not discharge as much water by the motion in one direction as in the other, in consequence of one side of the piston or plunger being partially occupied by the piston rod.

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# New Inventions.

### Inventions Wanted—Harvesters.

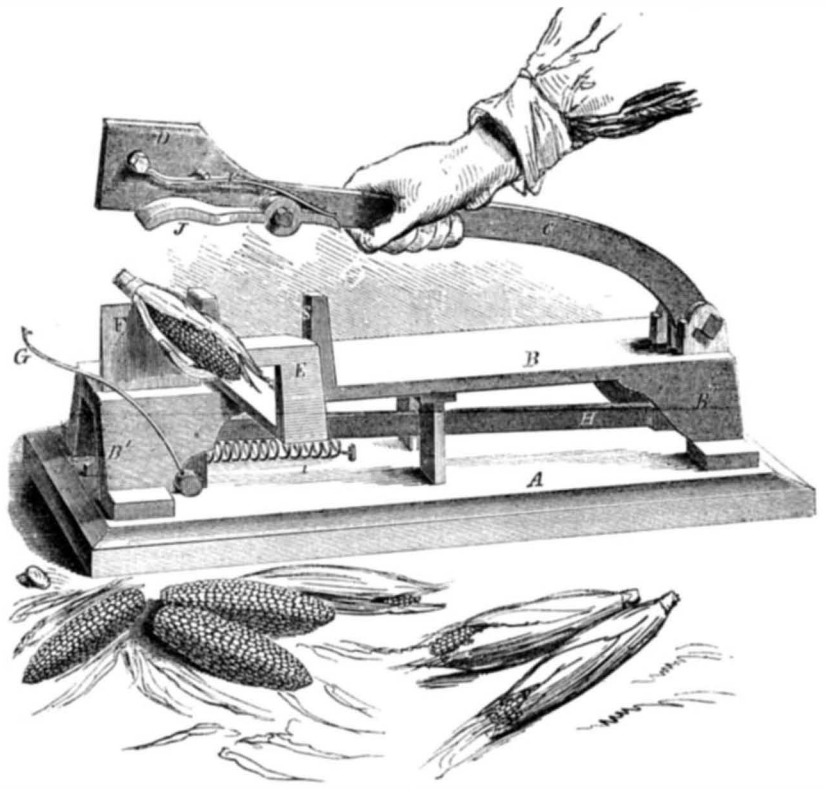
Although much has been done by inventors towards rendering reaping and mowing machines applicable to general use, there yet remains ample field for the further display of inventive skill. Some simple device to prevent side draft is much needed, and an invention to prevent this in the various machines would, no doubt, be of great value both to the inventor and the farmer. We believe that it has been proposed to use two main supporting wheels, each of which to be attached to a separate axle, so that by placing one wheel or axle in advance of the other, and by the use of cone pulleys made fast to the axles, the inner wheel can be driven by a chain or belt passing from the cone pulley, attached to the axle of the outer or inner driving wheel at a greater speed than the outer wheel, and thus the driver would be able at any time to change or shift the belt or chain—the cone pulleys being placed in reverse positions, so as to give the inner side of the machine such a tendency to describe a circle around the outer or main driving wheel as to relieve the horses entirely of side draft.

Another much-needed improvement is some mode by which the driver and raker can both be relieved of the exhausting labor of raising and lowering the finger bar and cutters to avoid obstructions. To effect this it has been proposed to use friction, so that the driver, by merely pressing his foot against a lever or friction pulley, could be made to press against a moving band or wheel, and thus quickly wind up a chain, or raise a rod attached to the finger bar, to elevate or depress the cutters, without the least effort on the driver or raker other than a slight movement of the friction wheel, &c. Owing to many objections urged against the reciprocating knife used in harvesters, it has been proposed to use a cutting apparatus of rather a novel construction, consisting of a series of short shafts, arranged in front, and directly under the finger caps, to which spiral knives are to be attached, so as to cut against each other, or against a fixed knife at each revolution of the shafts, the shafts being arranged to turn at right angles to the line of motion of the machine, the grain would be admitted between the knives at each revolution of the same. In the improvement of machines for gathering and harvesting the staple crops, there is ample scope for the inventive mind.

### Improvement in Husking Machines.

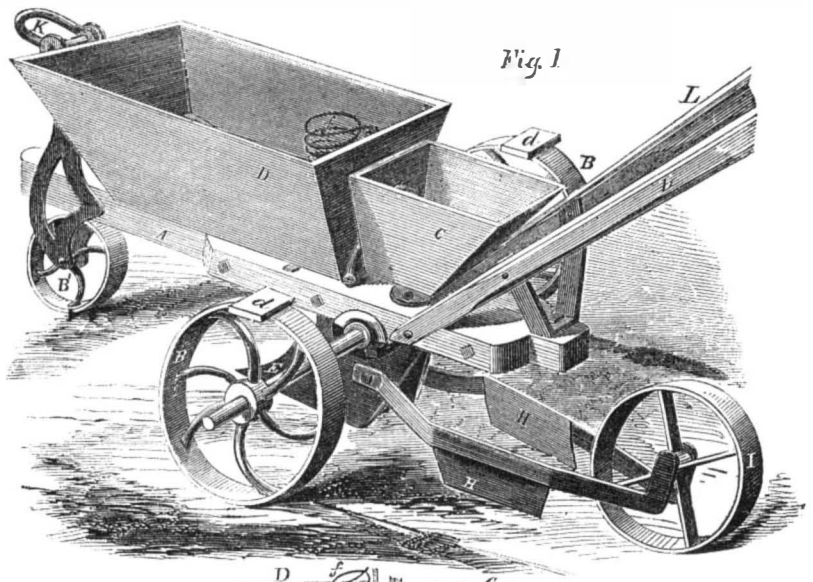
The accompanying figure represents a very original Corn Husking Machine, invented by William Lewis, of Seneca Falls, N. Y. An ear of corn is laid in the concave anvil or bench, E, with its butt over the edge of the wedge knife, F, then the hinged hammer, J, with its weighted head, D, is brought down—cutting the butt nearly through—then, when the hammer is raised, a curved arm, G, is impelled forward and clears the husks and butts from the bench, for a succeeding effort—the clean ear falling into a basket, or on the floor, as represented in the figure. A is the bed-plate or table for supporting the working parts. B is a plate with arched ends, B′ B′. The hammer lever, C, is secured on an axis-pin at the back end; it is furnished with a weighted head, D, and a hinged hammer J, which has a spring, K, pressing on it to bring it back into position. F is the wedge knife; E, the ear bench or anvil; G is the clearing-arm or rapper, secured on a bent vibrating axis-pin, inside of the front arch, B′. This axis-pin is secured to one end of the coiled spring, I, which throws the clearer, G, towards the ear to clear the husk from the bench; H is a reciprocating bar secured on a link connected with the lever, C, at the back end, inside of the arch; this bar has a crotch in it, under the front arch, B′—which crotch grasps the bent axis-pin of the rapper clearer, G; when the hammer, D, is raised, the bar H pushes G forward in the position represented; when the hammer, J, is brought down, and raps or strikes the butt of the ear and cuts it, and is again raised, the crotch described on the bar, H, passes over the axis of G, and then the coiled spring, I, attached to the axis pin, draws back the clearer with considerable force, knocking off the husks and discharging them as has been described. When the lever C is brought down for the hammer J to strike, and cut the butt of the ear, its back end or tail strikes on stop S, which graduates the force of the blow, allowing the nub or butt to be cut almost through—a pellicle only holding the nub and the husk together, the ear generally dropping down by the blow of the hammer, and falling into a basket. The

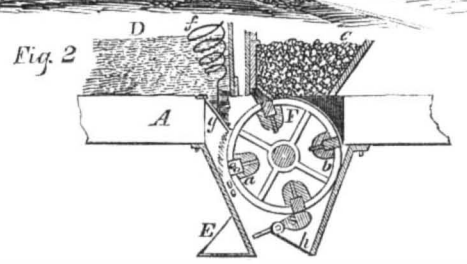
## LEWIS' HUSKING MACHINE.




clearer rod, G, removes the husks and butts—clears the *track* for the next ear. This is a very unique Corn Husker; a regular *rapper*. It is very simple in its construction; the parts are few, and so far as we can judge, not liable to get out of order. At the Mechanics' Fair held in Syracuse, N. Y., in February last, this Husker—from the original character of the invention—was a subject of general attention. It was on that occasion awarded a premium and a silver medal, and received the name of "The Magic Corn Husker." More information respecting rights, &c., may be obtained by addressing Mr. Lewis, at Seneca Falls, N. Y. by letter or otherwise. A patent was issued for it on the 3d of last month.

## McGAFFEY'S SEED PLANTER.




The accompanying illustrations represent the Seed Planter of Ives W. McGaffey. Patented April 3, 1855. Its seed cups are secured on a rotary wheel, and their capacity or size can be regulated to plant different quantities. It deposits guano, or other suitable manure, with the seed, which latter it covers, and then presses down with a roller.

Fig. 1 is a perspective view, and fig. 2 is a vertical section through the hoppers, the seed wheel, and conveying tube.

A represents the frame of the planter. B B B′ are three wheels, on which it is supported and runs. C is the seed hopper, and D the manure hopper. F is the distributing or planting seed wheel on the axle of wheels B B, and it is revolved as they move along. Fig. 2 shows how this wheel is formed. It has a thick periphery, in which are a series of cups *a b*, to receive the seed from the hopper as it rotates; it also has a series of projections, alternating with the cups; these are for striking and opening the spring valve or trap door, *g*, of the guano or manure hopper.

When a projection, has passed the valve, *g*, the coiled spring, *f*, closes the opening, by drawing the valve back. E is the shoe for making the furrow. The seed and manure, as shown in fig. 2, pass down through the conducting spout into the soil. The conducting spout is closed by a flap, *h*, when the machine is drawn backwards; *i* is a balance weight on the back of this flap. H H are angular set scrapers, for covering up the seed and I is a following roller for pressing down the soil.

In the seed hopper there is a brush, J, which sweeps the periphery of the wheel, allowing only the cups full of seed to be carried down the spout. The size or capacity of the seed cups are regulated by the screws shown passing into them from the inside of the wheel.

K is the draught shackle to which the horse is attached. L L are the arms or stilts—like those of a plow—by which the machine is held. On the wheels, B B, are markers, *d d*, which make an indent on each side of the drill at the moment the seed is deposited, so that each row may be commenced correctly, and whereby the seed may be dropped in line, to allow of the field being afterwards plowed crossways between the hills, if desired. The covering roller, I, can be raised off the ground when necessary. One or more seed cups may be used at once, as shown, so as to deposit the seed at different distances apart.

This machine is adapted for planting in hills, or rows; it is convenient, simple, and durable; and the depositing of the fertilizer with the seed is undoubtedly the best method of planting.

Address J. Hanford, assignee, No. 113 Nassau street, this city, for information respecting rights for a portion of territory.

### Stone Cutting by Steam.

During a recent sojourn in Washington we visited the Capitol grounds, and witnessed with much interest, the various operations connected with the work of enlarging the Capitol building Both wings are roofed over and well advanced towards completion. The great central dome is beginning to rise.

The marble columns, of which large numbers are required for the porticos, are being turned in huge lathes by steam power. Under a shed we saw one of the machines in operation. A block of marble 27 feet long, and over 3 feet diameter, was slowly revolving between the centers; the cutting was done by a pair of chisels carried on a slide rest in the usual manner. A stream of snow-white chips issuing from between the cutters, marked their progress.

The lathe is from the manufactory of Gage, Warner & Co, Nashua, N. H. It is capable of turning a column 30 feet in length by 4 feet or more diameter. Cost, $2,500. Driving power required, 5 horses.

The use of lathes for turning stone columns is not new; but we believe they have not heretofore been employed in this country to any extent. In Europe—Prussia particularly—lathes for turning stone columns have been in use for years. In New Hampshire, we are told, they are turning granite columns in lathes of similar construction.

### The Commissioner of Patents.

"There has been a strenuous attempt made to obtain the removal of Commissioner Mason, the present faithful and excellent head of the Patent Office, but the President has decided that Mr. Mason shall remain as long as he chooses."

We have reason for believing that the first clause of the above paragraph, copied from the *Evening Post*, is not correct. There have been no "strenuous attempts" made to oust Judge Mason, strange as it may seem; and the President has exhibited a convincing proof of his interest in the prosperity of the Patent Office, as a proud monument of the ever-growing genius of our countrymen, by the re-appointment of Judge Mason to the post he has so ably filled for the past four years.

### Purifying Gas.

Charcoal which has been saturated at a red heat with lime water, is now employed in some parts of England for purifying gas, instead of the simple milk of lime. The charcoal thus prepared is used in a vessel (the purifier) as a substitute for the lime purifier, and is said to produce a purer gas, by a more perfect removal of the sulphur and ammonia.

Mexico supplies us with a great deal of Mahogany, which is sold by the weight, averaging about $12 per ton. Under the revised Tariff it has been placed on the free list. Last year 6,804 tuns were exported from a single Mexican port, two-thirds of which came to the United States.

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Scientific American.

NEW YORK, APRIL 11, 1857.

### Lead, Lead Pipe and Shot.

We have just spent an hour in the manufactory of T. O. LeRoy & Co., in Water street, the concern before referred to as manufacturing drop shot, without a tower, under the patent of David Smith, one of the partners. The depth to which the shot are allowed to fall is forty-five feet, while the familiar shot tower up town, on the bank of the East river, allows the shot to drop 160 feet, the Centre street tower about the same hight, and the new one on Beekman street 200 feet. This latter is sufficiently high to manufacture, by the old processes, any sizes ever attempted by dropping; but the same sizes are also manufactured on the Smith principle by only dropping 48 feet, and as the best criterion accessible to us by which to most accurately judge of their merits, we may observe that the shot by each method of manufacture sells at precisely the same prices, and the manufacturers of both methods seem to be very busy. In the LeRoy establishment no special erection was necessary, but the shot are simply dropped through hatchways in the building. A series of pans of sheet iron, each some two feet in diameter, being prepared, the bottoms are punched full of holes of a given size and either is used according to the size of shot required. A pan is placed over the hatchway, and a man continually dips lead from a large kettle by his side, and pours it into the pan, occasionally stirring the bottom. The metal drops, in a silvery shower, some thirty feet in full view, and then enters the top of what resembles a steamer's smokepipe, the lower part of which stands in water. A powerful blower is connected with this large pipe, and forces up a current of cold air, more or less strong in proportion to the size of shot being manufactured; and elevators just outside, similar to those in a common flouring mill, are continually dragging up the wet shot, and pouring them on a steam heated platform to be dried, after which process they are sifted, to assort the sizes, and polished by friction with black lead in a machine for the purpose.

Drop shot are rounded by the mutual attraction of their particles. A drop either of water or lead voluntarily assumes the form of a perfect sphere, if unaffected by any external circumstances. If such a globule of lead can be left free until it cools, a perfect shot is produced, but in practice several difficulties are encountered. Shot require about three and a half seconds to fall 150 feet, and the rapid motion through the air cools them so much that a violent plunge into water at the end of that period does not indent them. It is necessary, however, in manufacturing shot of any considerable size by simple dropping to adjust the temperature of the lead very accurately. If too cold it chills on the pan as the drops are gathering beneath the holes, and if too hot the rapid motion through the air induces what are called "explosions" in many of the globules, and the shot assume every conceivable form except the one desired. Smith's process probably produces its effect partly by throwing up more particles, and that of colder air, into contact with the lead, and partly by suspending, or rather retarding, the fall of the lead. We had supposed that this latter effect was obvious, but it is not. The current of air employed to-day in the manufacture of small shot was, as far as could be judged by the effect on the hand, almost too insignificant to hold up cork.

Lead of commerce, unlike some metals, is almost chemically pure. Shot manufacturers put with each ton about half a pound of arsenic, the effect of which is to render the metal more fluid or more inclined to assume a perfectly spherical form in dropping. A large number of shot, however, in every kind of manufactory, prove imperfect, and are separated from the rest by rolling down a very moderately inclined plane of smooth iron. The round shot move gradually down without any difficulty, while the imperfect ones stop, and are brushed off.

Buck shot are moulded in short molds, a score or two at a time. The molds are so constructed that there is absolutely no neck on the shot, but when the lead is shaved off the top—which is done in about three or four seconds after its pouring—each shot is left with only a flattened side where the chisel has cut across.

Some eight or ten small machines are constantly employed in this manufactory, making compressed shot and balls. A flat bar of lead is fed in on one side of the machine, and is cut off into chunks resembling a brick. These are caught endwise between dies, and compressed into perfect spheres, the middle bulging out as the corners are forced in, so that the effect is a smooth, dense, and round ball. Buck shot or rifle balls—for they may be used indiscriminately—were being manufactured to-day by these machines, size OO, or eighty to a pound.

The same machines have been employed with success in making perfect pointed or Minie rifle balls of any required form, and when fitted with the proper size of lead makes them at the same rate—90 per minute—but the demand for such balls is very moderate in any country in time of peace.

Lead pipe is forced out cold, or rather at almost a melting heat, through a round orifice, in which a circular mandrel is placed. A hollow cylinder some eight inches in diameter, and two feet deep, is mounted on the plunger of a hydraulic press, and fitted with a bar of perfectly round and smooth cast steel rising from the center. This cavity is filled with melted lead, and, after waiting till it chills, the small powerful force pumps are set in motion, and the whole gradually rises into contact with a plunger fixed above. This plunger is also steel, and has a hole through its center, something larger than the smooth round bar referred to, and the pressure induced by the pumps on the plunger compels the lead to rise in the form of a pipe, and protrude itself from the top, where it is seized and coiled around a wheel. The pressure per square inch on the lead necessary to effect this operation is greater in proportion as the pipe to be manufactured is small and thin. The force of 150 tons is the maximum or greatest employed in this process, and is, as may be readily calculated, equal to about three tons per square inch on the lead, while the area of the water cylinder being about 132 square inches is subject to a pressure of a little over one ton per square inch. The water for the purpose is forced in by three single-acting plunger pumps, the cast steel and strongly guided plungers of which are each 1 3-4 inches in diameter, with a stroke of five inches. We give these as they may aid others in designing such hydraulic presses for great strains; but these though in constant use with perfect success, and therefore tolerably safe examples for imitation, are by no means the most powerful in use. The pumps employed in forcing to raise the tubes of the Britannia Bridge, in Wales, were 1 1-16 inches in diameter, with a stroke of sixteen inches, and produced a pressure of three tons per square inch on the water.

The wholesale prices of the materials under notice are at present about as follows:—Pig lead, 6 1-2 cents per lb.; bar lead, 7 cents; Pipe, 8 cents; Drop shot, 7 1-2 cents; molded shot or balls, 7 3-4 cents; compressed balls, 8 cents.

It would be interesting to know how great an increase of density is produced in lead or other metals by subjecting it to a given amount of compressive strain, but we are not aware that any experiments have been made on the subject.

### Etching Marble.

Trace figures on marble and then cover them with a varnish composed of sealing wax dissolved in alcohol, and allow them to dry. Now, pour over the surface of the marble, some dilute muriatic acid; it will bite or eat down the marble in the spaces not covered with the wax-varnish, which will remain in relief. The acid must be washed off when it ceases to effervesce, and before the varnish is removed.

### Mind and Matter.

The re-publication, by G. P. Putnam & Co., this city, of Sir Benjamin Brodie's recent remarkable work on "Mind and Matter" is a valuable addition to our scientific literature. What can be more interesting to man than the study of himself? To-day we find him a helpless infant; in a few years more, a thoughtless boy, chasing the butterfly as joyous and free as the "wandering winds;" then he becomes a man, and builds houses, ships, machines, towers, palaces, and cities; leads armies to battle, and extorts the applause of senates by his eloquence; then he drops into the grave, and soon becomes a few handsfull of dust. Is this being who leaves behind him such records of his existence and power—records that endure for thousands of years after he is dead—nothing more than dust and ashes—a mere piece of matter, like a stock or stone? In answer to such a question as this, Sir Benjamin Brodie says:—

"The properties of mind are wholly different from those of matter; the two are so completely asunder that they do not admit even of the most distant comparison with each other. I can easily imagine that motion, gravitation, heat, light, electricity, magnetism, and chemical attraction have something in common; that they are so far of the same essence as to be convertible into each other; but it is to me wholly inconceivable that any exaltation of the known properties of matter should produce the conscious indivisible *monad* which I feel myself to be."

The nervous system is composed of two substances of different organization; the one, called the *medullary*, is of a white color, soft consistency, and composed of fibres; the other is cellular in structure, of a still softer consistency, more largely supplied with blood vessels, gray in color, and not fibrous. This gray matter is smaller in quantity than the medullary, and is disposed in layers, in which the fibres of the latter seem to have their origin. Sir Benjamin says:—

"It is generally supposed that the function of the medullary substance is to conduct, direct, and make use of the nervous force, the latter being generated in the gray substance, and, in itself, always one and the same, though converted to different purposes in different parts, much as the electricity generated in a voltaic battery is made by means of one apparatus to produce chemical decomposition, and by means of others to direct the needles of the telegraph, or convert common iron into a magnet.

We may carry the parallel between the nervous and the electric force further still. Although the gray matter of the nervous system is necessary for the production of the former, it is not, in itself, sufficient, any more than the alternate plates of zinc and copper are sufficient for the production of electricity.

The acid solution added to the voltaic battery is required in one case; the presence of blood which has obtained a scarlet color, and undergone other changes by exposure to the air in the lungs, is necessary in the other."

This comparison of the brain to an electric battery is nearly similar to that of Napoleon the Great. Just after Volta (in 1800) had discovered the *pile* which bears his name, Napoleon sent to Italy and invited him to visit Paris and exhibit his experiments before the *savans* of that city, that they might hear from his own lips the mode in which he had pursued the subject. Volta came, and spent three or four days in lecturing to the French Institute upon the details of the subject. The effect produced upon dead bodies by galvanic action—now so well known—was there exhibited, and excited universal astonishment. Napoleon, while witnessing these experiments, turned to Corvisart, his physician, and mentioned the striking analogy between the phenomena of galvanism and those of life, and went on to show how the vertebral column (spinal marrow) might act as a voltaic pile.

In 1830, Sir John Herschel made an observation in his preliminary "Discourse on Philosophy" bearing a striking analogy to that of Napoleon, without any knowledge of the above anecdote. He says:—"If the brain be an electric pile constantly in action, it may be conceived to discharge itself at regular intervals along the nerves which communicate with the heart, and thus to excite the pulsation of the organ." Dr. Arnott published a work on physics, quite a number of years since, in which precisely the same idea is suggested.

Sir Benjamin Brodie is very distinct and clear in reference to the action of scarlet blood on the brain as the exciting liquid of the nervous system. "If dark colored or venous blood," he says, "be substituted for arterial blood, and transmitted to the brain by the arteries, insensibility is produced in the individual. It acts as a narcotic poison." Strangulation, drowning, and fits of apoplexy produce these results. The total suspension of the supply of arterial blood to the brain for a very few minutes is sufficient to produce death. The infamous system of garrotting, or strangulation, which has of late become notorious in New York and other places in connection with robbery, is as dangerous as it is wicked; and its perpetrators, in every case, should be assigned a place with murderers.

The necessity of breathing pure air, in connection with a healthy condition and proper action of the lungs, is, therefore, apparent, in order to supply the brain with red blood. Various substances taken into the lungs in the state of gas, or into the stomach in the form of liquids or solids—when taken in excess—produce the same effect upon the brain as venous or dark colored blood. By inhaling chloroform, ether, or nitrous oxyd gas, according to the quantity partaken of, the mind will be subject to peculiar hallucinations, or will become utterly unconscious. Alcoholic drinks stimulate the nervous system, and excite to mischievous actions. The effect of narcotics, such as opium, when taken into the stomach, is to soothe the nervous system. Sir Benjamin Brodie considers that the use of opium is less dangerous to individuals and society than gin. "Desperate characters," he states, "prepare themselves for criminal undertakings by libations of ardent spirits; never by opium. It is worthy of notice that opium is physically much less deleterious to the individual than gin or brandy. Many opium-takers live to a great age, while dram-drinking induces disease of the liver, with its attendant bodily suffering, ill temper, wretchedness, and premature death." These opinions are contrary to those entertained by the public generally.

The effect of opium on the mind is to fill it with the most gorgeous images. The world is shut out to the opium-eating Turk, but he sees in the imagery of his brain, cities, temples, genii, and fairy lands.

The Hindoo uses an intoxicating drug called "hachish" (an extract of Indian hemp) to produce sensations as peculiar, though altogether different, from those of opium. He becomes intoxicated, but not with things of the imagination. Minutes seem to him like hours, and hours like years; whispers sound like rolling thunder, sparkling waters assume the most gorgeous colors, green, purple, blue, and gold. It is remarkable that a number of persons who have been rendered *insensible*—a common, but loose term—by drowning, relate their experience of sensations very similar to those produced by the hachish.

### India Rubber Patent Cases.

On the 31 inst., at Providence, R. I., Judge Pittman, U. S. Circuit Court, granted an injunction against Messrs. Bowen, Brown & Chaffee, preventing them from manufacturing india rubber boots and shoes. The injunction was applied for in the name of Chas. Goodyear and other associates.

On the same date, in the U. S. Circuit Court, this city, Judge Ingersoll presiding, an injunction was granted against the Union India Rubber Co. in favor of the New England Car Spring Co., to prevent the defendants from manufacturing india rubber car springs.—These two cases related to terms of sale and assignment, not infringement of patent.

India rubber is a tough subject—now one party victorious, and now another, before the courts. The lawyers understand how to bring out all the grand elastic and never-ending law qualities of this material.

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### The Pressure of Confined Gunpowder when Fired.

We quoted last week from Prof. Treadwell's paper on the practicability of large cannon of very long range. We now present another quotation from the same, which, with the added facts, may be of much interest to many of our readers :—

"The expansive force of gunpowder, which must be resisted by the strength of the cannon, depends almost entirely upon the circumstances under which it is fired. Count Rumford has shown, by his experiments made about sixty years ago, that if the powder be placed in a closed cavity, and the cavity be two-thirds filled, the force will exceed 10,000 atmospheres, or 150,000 pounds upon the square inch; and he estimates that if the cavity be entirely filled with the grained powder, and restrained to those dimensions, the force will rise to 50,000 atmospheres. My own experience, made in bursting wrought iron cannon, the strength of which was known to me, leads me to believe that he has not overestimated its power, although I am aware that it is generally considered as excessive. If, following an opposite course to that herein described, the powder be at liberty to expand upon any side the force thrown in the other directions is very small. Thus, if a charge be placed loose in a gun, without shot or wad, the force upon the walls of the gun is very trifling—no more than is produced by the restraint of the inertia of the charge itself, or the fluid formed from it.

If we could divest a charge of this property of inertia, and fire it in a constantly maintained vacuum, it would not rend walls made of cartridge paper, if a single end were left open for its escape. From the preceding statement it will be seen that gunpowder will take any force, from perhaps 50,000 atmospheres, when confined to a close cavity, down to zero, if it be deprived of inertia and fired in a vacuum constantly maintained.

In artillery practice, the restraining power which causes the powder to act against the walls of the cannon, is derived principally from the inertia of the shot. This is so much greater than the inertia of the powder itself, that the latter may be neglected in the considerations that are to follow. Now, bearing in mind what has been already said, let us compare the difference of the force of powder as exerted upon a small and large gun respectively. It is perfectly well known that, if we have a pipe or hollow cylinder of say two inches in diameter, with walls an inch thick, and it this cylinder will bear a pressure from within of 1,000 pounds per inch, another cylinder of the same material, of ten inches in diameter, will bear the same number of pounds to the inch if we increase the walls in the same proportion, or make them five inches thick. A cross-section of these cylinders will present an area proportional to the squares of their diameters, and if the pressure be produced by the weight of plungers or pistons, as in the hydrostatic press, the weight required in the pistons will be as the squares of the diameters, or as 4 to 100."

Fifty thousand atmospheres is equal to a pressure of 750,000 pounds per square inch. Prof. Treadwell speaks of his own experience, and we have always a very high respect for any conclusions arrived at by an intelligent man from actual observation; but the figures found by Count Rumford, have, we think, been since sufficiently proved to be too high.

In October 1844, several stout guns were tested by the hydraulic press, at the expense of the U. S. Government. The first burst with 9,000 lbs. pressure; the second "sprung aleak" in several places under a pressure of 9,500 lbs., and soon vented the water too fast through its pores to keep up the pressure; the third burst with 9,860 lbs.; and a fourth with 12,400 lbs. There was certainly no reason to suppose that the guns would have withstood any more strain if applied suddenly by burning powder. But the strain on a gun is, of course, greatest near the breech, dying away as the charge expands; and guns are made thicker at the breech to provide for this.

The principles on which to estimate the strength of cannons, water pipes, etc., were not well understood until a comparatively late period, and it is probable that the extravagant results attained by the early experiments are due to that fact. Count Rumford, for example, who has been quoted as authority even by Prof. T. above, based his calculations on the bursting strength of a small eprouvette, which there are reasons for believeing did not actually possess more than one-tenth the resistance to a sudden force from within which he assigned to it.

Dr. Wm. E. Woodbridge and Major Alfred Mordecai made experiments at the arsenal at Washington in 1854–'5, in which the pressure of the powder was ascertained directly by a delicate piezometer, in which accurate means were employed for measuring by the compression of oil. A very thick and strong gun was employed, and the piezometer, very strongly and nicely constructed of steel, was introduced in a hole in the side, so that the full force of the powder might be felt on a small piston, and thus transmitted to the oil. With a ball weighing 6 1-2 lbs. and a charge of 1 1-2 lbs. of Dupont's cannon powder, a pressure of about 20,000 lbs. was produced. At one foot from the breech it was only 8,000 lbs., at three feet 6,000, and at four feet 5,900 lbs. per square inch. These facts, although important, do not bear on the main question —the pressure of powder when absolutely confined—but another experiment made under the same auspices does. A quantity of Hazard's rifle powder was fired in a cavity, from which there was no possible escape. A hollow cylinder of cast steel, 1 1-2 inch outside, with a bore of 1-4 inch, was filled up close with Hazard's Kentucky rifle powder, but without shaking or crowding, and was then confined very effectually, and fired by a flash of powder penetrating through a valve opening inward. To be sure that the valve or other parts did not leak some of the gas, the cylinder was placed under water. The pressure was undoubtedly very great, but was insufficient to burst the box, which box, from calculations made on its thickness, etc., would have been ruptured by any force exceeding about 93,000 lbs. per square inch. This is very different from the 750,000 lbs. of Count Rumford; but it is very probable that the gases from larger quantities of powder being less cooled by presenting proportionably less surface to the cold metal, would display a somewhat greater pressure.

The experiments of Woodbridge and Mordecai here quoted, if they do not show the absolute pressure of powder confined, give results of very great importance in showing how the pressure diminishes from the breech toward the muzzle, in an ordinary cannon. It may be presumed that the pressure in a musket or rifle diminishes with equal rapidity, and that the breech of small arms should, in order to be of a truly scientific form, be made with even more thickness in proportion to the muzzle than is now usually adopted.

### Turbine and Overshot Wheels.

A recent number of the Paterson (N. J.) *Guardian* contains a communication from L. Holmes, giving a statement of the work accomplished by a turbine and an overshot wheel, the former in the Phenix mill, and the latter in the Passaic mill No. 1, in Paterson. Both mills manufacture cotton duck, and use the same kind of machinery. They are situated on the same raceway, within five hundred feet of each other. The overshot wheel of the Passaic mill is 19 1-2 feet in diameter, and it is stated to be in excellent working order; the water is gaged by a four foot gage, (576 inches area,) properly placed on a level with the bottom of the race; it takes most of that water to operate their machinery, running two thousand spindles with weaving and other machinery in proportion. The quantity of work done by a certain number of spindles correspond with the work done by a like number in the Phenix mill. Mr. H. says :—

"The machinery of this latter mill is operated by a Jonval Turbine wheel, five feet in diameter. The amount of water belonging to this company is five feet, or an opening of 720 inches area, gaged in the same manner and under the same restrictions as the Passaic No. 1, but only 480 in. area of water is used. This runs 3000 throstle spindles and 2500 mule spindles with weaving, twisting machinery, &c." Mr. Holmes says, in reference to such results, "throwing the 2,500 mules entirely out of the question, the comparative result would be :—

| | | | | |
|---|---|---|---|---|
| Passaic No. 1, | 576 | inches water, | 2000 | spindles |
| " or, | 288 | " | 1000 | " |
| Phenix Mill, | 480 | " | 3000 | " |
| " or, | 160 | " | 1000 | " |

A result *exactly* 80 per cent. greater that is obtained from the wheel of the Passaic No. 1. said to be of superior construction.

This immense increase of power in favor of the Turbine wheel, as constructed for the Phenix Company does not by any means prove that the Turbine wheel has this overpowering superiority in *all* cases; although from 15 to 25 per cent. increase will always be guaranteed. It only goes to show—and pretty conclusively — that overshot water wheels *are* sometimes, if not frequently, constructed according to the mysterious "rule of thumb," and that the most cautious manufacturer *may* get a very poor result, sometimes, even from this well tried and ancient motor, when he vainly supposes that he has got all the value of his water."

The article does not state who put up the turbine in the Phenix mill, but we have been informed that its makers are Messrs. Collins & Gilbert, of Troy, N. Y. We had no conception that there was a single overshot wheel running in our country, and doing such a small amount of work in proportion to the water power, as that of the Passaic mill, and Mr. Holmes' irony we hope will not be thrown away on our millwrights and manufacturers.

But we have made a visit to the mills and gaged the water. Making allowance for the difference of head under which the two gages are working, the quantity of water used by the two mills are practically alike, the Passaic using about 55, and the Phenix 56 cubic feet per second. Strictly speaking, the latter uses 2 per cent. more water, and by the peculiar circumstances, has the advantage, practically, of two feet more head, so that instead of less, it would, with a precisely similar wheel, etc, develope *more* power. Mr. Holmes is probably correct in his other points, which we had not time to investigate.

### Electric Printing on Glass.

A process for printing designs on glass by electricity has been discovered by W. R. Grove, of London, inventor of the galvanic battery which bears his name, and he has given an account of his experiments in the *Philosophical Magazine*. Two plates of window-glass, about three inches square, were dipped in nitric acid, then washed, and dried with a clean silk handkerchief, and coated on the outside with pieces of tinfoil a little smaller than the glass. A piece of a printed hand-bill was laid between the plates thus prepared; the tinfoil coatings were connected with the secondary terminals of a Ruhmkorff's coil, and removed after a few minutes' electrization. Now, "the interior surface of the glass when breathed on, showed with great beauty the printed words which had been opposite it, these appearing as though etched on the glass, or having a frosted appearance; even the fibres of the paper were beautifully brought out by the breath, but nothing beyond the margin of the tinfoil." These impressions were fixed by holding them over hydrofluoric acid—powdered fluor spar and sulphuric acid slightly warmed in a leaden dish.

Mr. Grove cut out of thin white letter-paper the word Volta, and placed it between the plates of glass. They were submitted to electrization as before, and the interior surface of one of them, without the paper letters, was subsequently exposed in the hydrofluoric acid vapor; the previously invisible figures came out perfectly, and formed a permanent and accurate etching of the word Volta, as complete as if it had been done in the usual mode by an etching ground. This, of course, could be washed and rubbed to any extent without alteration. The results obtained give every promise for those who may pursue this as an art, of producing very beautiful effects, enabling even fine engravings to be copied on glass, &c.

A plate of glass on which a slightly visible image was impressed, was immersed in a bath of nitrate of silver, in the usual manner as for a photograph. It was then held opposite a window for a few seconds, and taken into a darkened room; and on pouring over it a solution of pyrogallic acid, the word Volta, and the border of the glass beyond the limits of the tinfoil were darkened, and came out with perfect distinctness, the other parts of the glass having been as it were protected by electrization from the action of light. The figures were permanently fixed by a strong solution of hyposulphate of soda.

### Lightning Conductors.

This subject, so interesting to such a large number of our readers, has recently been brought before the Royal Scottish Society of Arts, by William Hepburn, who read a paper on it, advocating the use of balls instead of points on the upper ends of the rods. He stated that he had been led to doubt the efficiency of the conductors usually adopted, terminating in points, which was contrary to the plan found to be necessary in the management of artificial electricity, in which, while the fluid is gradually collected from the excited cylinder by a row of pointed wires attached to the prime conductor, its transmission from the conductor to the battery itself is always effected by balls. Mr. Hepburn believes that the conductor ought to terminate in one or more pear-shaped balls having a surface sufficient to absorb at least, as much of the fluid as the descending rod is capable of carrying to the earth.

It is hardly necessary to say that we consider Mr. H. entirely wrong. Points universally receive and transmit the fluid withless resistance, and consequently tend to make a lightning rod more efficient, but the reception or discharge of the same is accomplished with less shock, in consequence of its being performed more gradually. Prime conductors in electrical machines are rounded for a purpose the opposite of that for which conductors on buildings are designed. The first are to retain and prevent, the second to *aid* the flow of the fluid. Good conductors on buildings produce effects by silently and gradually promoting an equilibrium between the electrical condition of the atmosphere and that of the earth

### Meerschaum Pipes.

The clay of which these are made is procured chiefly in Asia Minor, but also in Spain, Greece, and Moravia. The manufacture of pipes from the clay is carried on with especial care at Vienna and Pesth. The meerschaum is soaked in a liquefied composition of wax, oil, and fat, the absorption of which occasions the colors assumed by the pipe after smoking. Occasionally the bowls are artificially stained, by dipping them in a solution of copperas and other substances, before the application of the wax composition. The carving of the bowls is often difficult work, owing to the occurrence of a kind of clay mixed up with and harder than the meerschaum. The large quantity of parings left in roughing out the bowls would entail considerable loss unless some process had been devised for using them This has been done; the parings are employed in making the kind of meerschaum bowls called *massa-bowls*. The parings are ground to a fine powder, boiled in water, and molded into blocks, with or without the addition of clay. The blocks are allowed to dry, and then a pipe-bowl is fashioned from each.—These bowls are distinguished from the real meerschaum chiefly by being rather heavier.

Meerschaum bowls have been produced so large and so elaborately carved as to be valued at $500 each.

### Railroad Expenses.

The working expenses of the Great Western Railroad in England, amounts to about 40 per cent. per annum, of the gross receipts. The working expenses of our railroads amounts to about 60 per cent. It costs more to keep our railroads in repair; they are not so solidly built as the English ones.

### Correction.

The residence of Mr. R. Hurd, inventor of the seed plaater illustrated in No. 24, present Volume of the Scientific American, is at Springhill, Whiteside co., Ill., instead of Moline, as there stated.

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H. W., of Ohio.—We do not think a patent could be secured on your engine. The application would almost certainly be rejected, on account of some of the portable engines for similar purposes that have been made in England, where much more has been done in getting up engines of this kind than in our own country.

H. N. O., of Texas—We cannot recommend you to apply for a patent on the device you propose for applying rosin to violin bows. It does not, in our opinion, contain novelty sufficient to justify an application for a patent.

E, M. R., of Pa.—We are glad you suggested to us that Haltzapffel's Mechanical Manipulation contains considerable information about blacksmithing. We had overlooked this fact. You can get a good churn at any of the agricultural warehouses in this city.

U. N. M., of Del.—We know of no book specially devoted to paper or paper making. Should judge that your boiler would be cleared very efficiently by a pipe movable through stuffing-boxes, so as to receive the blow-off from every part of its bottom, particularly if, as you suggest, the end be fitted with a scraper, but should imagine that there were serious practical difficulties in the way of its adoption.

J. T., of Del.—Yes. There are several besides Corliss & Nightingale who make engines in which the regulator is attached to an adjustable cut-off. The best and cheapest steam pump for supplying high pressure boilers may probably be procured of Guild & Garrison, Brooklyn, or of John D. Shepard, Buffalo. Write also to H. R. Worthington, this city.

W. B., of Pa.—We are open to conviction, but do not believe that one per cent. more effect can be gained by letting the water strike a flutter wheel at one angle than at another. At what point it should range between the center and the periphery of the wheel is another and more difficult question; and what the form and arrangement of the buckets and the shute should be is disputed, and will be until millwrights become unanimous in favor of some one kind of whee.

W. B. Pringle, Jr., of Charleston, S. C.—Wishes to procure the address of a manufacturer of machinery for preparing dressed staves for rice barrels. He also wants information in regard to hoop machines.

P. B., of Conn.—Send down your model without delay, and we will prepare your case at once. Your improvement seems to be a valuable one, and if you can accomplish by it what you expect, it cannot fail to reward you handsomely. Do not delay an application.

N. W., of L. I.—You say you have invented a self-moving machine, and ask us to loan or procure a loan of $1000, in order to enable you to develope it—offering as a consideration a one-hundredth part of the proceeds of your invention. Now, as we do not believe that you have or can invent such a machine, you may reasonably conclude that your application will be unsuccessful. We advise you not to misapply your time and talents upon so absurd a vagary as the one you are now pursuing. It is a phantom.

J. D. C. & Sons, of Vt.—When we publish the address of a correspondent who may wish to purchase some particular machine, etc., it is not expected that parties will use us as the medium of communication; therefore, you will please to write directly to the party whose name is given. From the description of your alleged improvement in mallets, we do not think a patent can be secured for it. We believe that mallets have been made substantially in the same manner. Perhaps, you had better send one to us for examination.

J. S., of Cal.—Such a publication as you mention would, no doubt, be very useful, but we have no know ledge of it.

S. B., of Pa.—A strip of wood standing on four inclined pointed legs, so that its successive expansion and con traction with the changes of moisture, will induce it to crawl slowly along on the floor, has been explained and illustrated in some philosophical text books.

T. D., of Ala.—A sill just outside of a railroad track, bolted to the cross-ties the whole length of the track, to keep the cars from running off, would be very much in the way of the ordinary repairs of the track, but might possibly be practicable.

H. B., of Pa.—There are almost a score of oscillating engines operating in the manner you describe.

P. & B., of Richmond, Va.—We sent you one of our Circulars, but could not give it a proper address, as you did not furnish us with your name.

T. A. D., of Cal.—Your letter of the 18th inst. we answered by the last mail. It came safe with the remit tance of $20. The sketches of your over-shot wheels having buckets arranged on an endless band, have been carefully examined. This plan is very old, and is far inferior in point of effectiveness to many of the more recent improvements. You are therefore advised to abandon it. If you send us sketches of your Marine Telegraph we shall examine it.

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Money received at the Scientific American Office on account of Patent Office business for the week ending Saturday, April 4, 1857:—

W. A. F., of Conn., $25; E. B. B., of N. Y., $30; E. B. of N. Y., $30; G. J. M., of Conn., $55; T. & B., of Mass., $25; C. J. F., of N. Y., $30; A. B. G., of Conn., $30; B. W. F., of N. J., $30; S. G. Jr., of N. Y., $275; P. & N., of N. J., $30; D. P., of N. Y., $25; S & L., of Wis., $25; A. P., of O., $10; L. W., of Mass., $20; J. W. F., of Mo., $35; H. K., of N. Y., $30; J. J. C., of Mass., $26; J. T. H., of Pa., $27; J. M., of O., $25; H. N. T., of N. Y., $30; N. J., of N. Y., $55; H. N. D., of N. Y., $25; E. L. L., of N. Y., $30; W. W. B., of N. Y., $30; R. W. B., of Pa. $30; J R. G., of Wis., $35; G. W., of N. Y., $30; H. W. A., of N. Y., $475; B. & B., of Conn, $25; S. B., of N. Y., $55; W. T. DeG., of N. Y., $30; G. M. Jr., of Ill., $25; J. C., of N. Y., $60.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, April 4, 1857:

W T. DeG., of N. Y.; J. C., of N. Y.; J. K., of N. J.; S P., of Cal.; T. & B., of Mass.; C. A. W., of Conn. (2 cases); T. E., of Pa.; J. & Y., of L. I.; A. E. H., of N. Y.; D. P., of N Y.; J. J. C., of Mass.; G. M. Jr., of Ill.; A. P., of O.; S. G. Jr., of N. Y., (2 cases); J. T. H., of Pa.; J. M., of O.; B. & B., of Conn.; J. R. G., of Wis.; J. H. of N. Y.; H N. D., of N. Y.; J. W. T., of Mo.; H. W. A., of N. Y.


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# Science and Art.

### Steel for Tools.

A great diversity of opinion exists, and many crude ideas are to be found afloat respecting the best methods of tempering steel instruments. Numerous recipes may be found scattered here and there throughout various works, purporting to give the best kinds of liquids or *pickles* for tempering; but they are generally given without discrimination. One mechanic tries to temper a tool by a recipe which another states he has found to be perfection, and lo! he fails to effect his object. He then tries another method and succeeds to his satisfaction, and straightway denounces the recipe which was successful in the hands of another, and extols his own method. Why is this? Recipes for tempering tools, are generally given upon the experience of particular cases, and not arranged scientifically. The process of tempering of tools, not only embraces the pickles to be employed for dipping the heated tools into, but also the temperature to which these tools should be heated; and more than all this, it embraces a knowledge of the quality of the steel to be tempered. No person can be a skillful instrument maker, nor can he temper tools accurately, unless he has a sound knowledge of the various kinds of steel; because the method that would be successful for tempering one kind, would utterly fail for tempering another kind of steel. There is a great diversity of steels, all sold at the same price in the market; therefore, unless tool makers have a knowledge of their various qualities, and purchase with discrimination, it is easy to perceive how that one person will fail to temper a tool by one process, by which another will succeed perfectly. A tool maker must suit his tempering process to the quality of his steel, and it should be of a character adapted for the purpose intended. The hard steel suitable for a pick, or a cold chisel, is made by a different process from that designed for surgical instruments, and in tempering, it must be treated differently. Our object at this time is not to present any theory or description of processes for tempering tools, but to direct the attention of instrument and tool makers to the importance of acquiring a knowledge of the various kinds of steel manufactured, and to caution them in reference to the purchase of the particular qualities most suitable for their business. We make these remarks because we are positive that most of the trouble and expense caused in the failure of so many steel instruments, such as dies, chisels, and other forged tools of which we have heard so much, is attributable rather to improper selection of the steel from which they are made, than the processes by which they have been tempered.

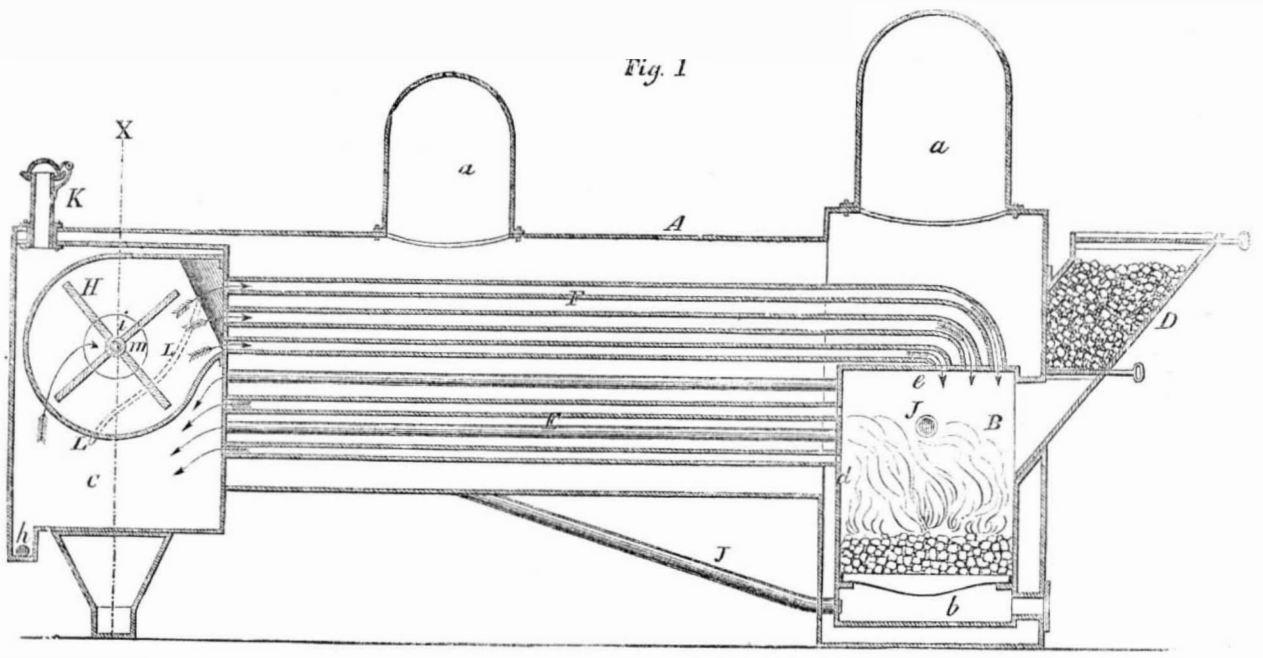
### Smoke-Burning Furnace.

In Great Britain, where bituminous coal is largely employed, much attention has been bestowed on the practicability of efficiently and economically consuming *all* the fuel, so that nothing should be discharged into the stack but pure carbonic acid gas and nitrogen, instead of as usual discharging many cinders or small coals, much "smoke," (which derives its color from similar but smaller particles of valuable fuel) and great quantities of carbonic oxyd or half burned gas, a gas ranking in value between the coal gas usually employed for illumination, and the dead and fire-extinguishing carbonic acid. Smoke burning has never been esteemed a matter of so great importance in this country with any of our various fuels, whether wood, soft coal, or anthracite, but the reports of scientific experimenters employed by government and by various private parties, show it to be a matter of no little moment. The flames frequently seen at the tops of the chimneys of steamers are due to the combustion of escaping gases at those points, but owing to their dilution with the obnoxious acid or other causes, we have rarely seen them of sufficient brightness to indicate to the eye any very intensely concentrated heat. Occasional leaks of air into the fire-boxes of locomotives have, however, induced the metal of the same not in contact with the boiler to become red hot, and this fact alone is enough to prove that with wood for fuel much gain might sometimes be derived from simply supplying fresh air to the furnace or flues above the grate. This mingling of air with hot smoke is in fact the basis of all the devices which have been promulgated for smoke-burning, but they all sink into insignificance in comparison with the novel arrangement here presented. This attempts, and, as it would appear, with success, to assort the gas, reserving and returning all the unburned portions, and rejecting the remainder.

The inventors are Messrs. John Case and Isaac Soule, both of Amsterdam, N. Y., who have made it the subject of a patent dated Dec. 23d, 1856. Figure 1 represents a longitudinal, and figure 2 a transverse section of a boiler arranged according to this invention. In its general form the boiler is a tubular or "locomotive" boiler. The ash pit, *b*, is closed tightly except on first starting the fire, and when in full operation receives a constant blast of ordinary fresh air at a moderate pressure through the pipe, J, beneath the boiler, into which pipe it is forced by one of the fans, I I. This air rises through the grates and urges the fire in the ordinary manner, and the escaping gases from the fire flow in a highly

## SMOKE-BURNING FURNACE.

*Fig. 1*

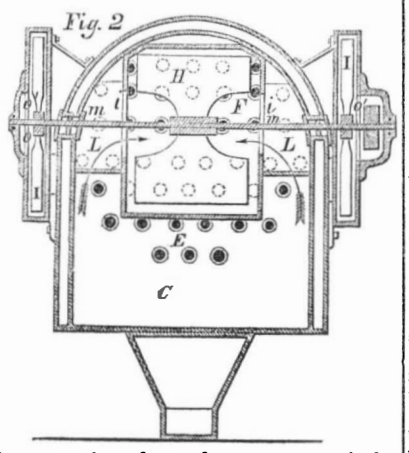



heated condition into the ordinary tubes, E, through the sides of which they impart most of their heat to the water. Emerging from these tubes, the mingled gases, are deflected downwards by the inclined diaphragm, L, represented by dotted lines, immediately following which the heavy cinders are deposited, and the important step of separating the combustible gases from the incombustible ones is performed by the simple gravity of their particles. In the bottom of the fire-box, C, is an opening through which gas is continually escaping into a chimney, not represented, and is thus finally disposed of. In the top of the same fire-box is a broad and powerful fan, H, in rapid revolution, continually drawing in gas at its center, and discharging it at its circumference, from whence it flows back through the tubes, F, yielding up to the water on the passage still more of its heat. The difference in the gravity of the gases in the smoke-box, C, after their deflection downwards by the plate, L, is relied on to furnish a tolerably complete separation, so that the fan urges back to the fire and discharges at *e e*, only carburetted hydrogen, carbonic oxyd, etc., while all the other and deleterious products of combustion escape from the bottom of the box, C, the combustible gases being thus passed in a circuit until fully oxydized or burned in every instance. The fans, H and I I, are all mounted on the same shaft. One of the fans, I, blows fresh air below the grate, and the other supplies the same vital element above the burning fuel, both pipes for these purposes being represented by like letters.

The inventors have experimented with all the three great varieties of fuel in use. We give the history of the invention and of their experiments in their own words below, as a clear and straightforward statement of what they have done and intend to do, premising, however, that as in the experimental construction no water was present to absorb the heat from the flues, that portion relating to the comparative temperatures at different points is entitled to but little consideration.

"The first successful experiment in burning smoke, and the combustible gases produced in the ordinary consumption of fuel, was made early in July last. The apparatus used was a rude one, consisting of a fire-box, smoke chamber, and two flues made of five inch stove pipe, with the necessary fans for supplying the grate with cold air, and for returning the heated air and hydro-carburetted gases to the fire-box. The smoke was at first introduced below the fire. This did not fully answer our expectations, and it was then admitted above. The result was so satisfactory that a more perfect apparatus, and careful experiments were determined upon. We then constructed a new fire-box 10×12 inches in the clear, a smoke chamber to correspond, and connected them by eight flues, (four direct and four return) of three inch caliber and five feet in length. With this, using only twenty-five pounds of Lackawana coal, an intense fire was kept up for three hours, estimated as sufficient to generate steam enough for an engine of five horse power, all the smoke, sparks, and combustible gases, so far as we could discover, being entirely consumed. During the next three hours coke, bituminous coal, and wood were successively tried with like results. Water placed on the top of the smoke chamber boiled a little sooner than on the top of the fire-box. Oil dropped on the middle of the return flues dried simultaneously with that dropped on the direct flues, showing the fact that nearly or quite one half the heat generated in the ordinary furnace escapes through the smoke pipe to say nothing of the loss due to imperfect combustion. The feasibility of thus sustaining a fire being established, we propose to make in the production of steam, (by consuming all the fuel, and by retaining and using all the heat generated), a saving of from fifty to seventy per cent, and by burning the smoke and sparks to remove a nuisance. We propose also a great economy in the construction of boilers, since by our arrangement they may be made shorter than where the heat is allowed to escape through the smoke stack. Both of which are items of no small consideration.

*Fig. 2*




We have now a working model of three horse power nearly completed, which we contemplate exhibiting in the city of New York about the middle of April, due notice of which will be given in the daily papers."

For further information address Case & Soule, Amsterdam, N. Y., or E. B. Earle, at same place.

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